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EDITORIAL.

Pests and Diseases at Cameron Highlands.

By reason of the fact that neither the climate nor the crops at Cameron Highlands are typical of the rest of Malaya, the Department of Agriculture has been fully alive to the probability that the development of agriculture in this area would introduce new problems concerning pests and diseases. Prompt recognition and early application of methods of control are essential, and on these may depend the ultimate success of agricultural enterprise on the Highlands.

In the present number we publish an article by Mr. A. Thompson on potato diseases at Cameron Highlands. The diseases described are familiar to cultivators of this crop in many other countries, and in the absence of control, have resulted in famine and widespread loss to farmers.

The incidence and behaviour of these diseases under conditions at Cameron Highlands have been studied, and in the article in question planters interested are placed in possession of the facts which will enable them to take the necessary steps to protect their crops from the very serious loss which will be the result of neglect.

Apart from the control measures on the plantations, two other methods of protection suggest themselves; the inspection of imported planting material, or the prohibition of imports. The chief difficulty against relying on inspection is the fact that potatoes are not only imported for seed purposes but for consumption and it would be a practical impossibility to ensure that potatoes imported for consumption were not used for seed purposes. The prohibition of imports is only practical in countries where the economic production of the entire internal demand is possible. This does not apply to Malaya, into which country about 8,000 tons of potatoes are imported annually.

The only alternative, therefore, is for growers of potatoes in this country to exercise vigilance to guard against the introduction of diseased planting material, and against the spread of any disease which may become evident.

The problem is undoubtedly a serious one, but its solution is by no means hopeless. Diseases will be less likely to jeopardize potato-growing at Cameron Highlands if planters make themselves familiar with the symptoms of the

diseases to be expected, and follow carefully and promptly not only the methods recommended for treating the diseases should they appear, but also the precautions designed to minimize the chances of loss.

Indian Buffaloes.

The Indian buffaloes kept by Punjabi herdsmen are a not unimportant factor in the milk supply of this country. We include in this number an account of this industry in the Kuala Lumpur district, where conditions are fairly typical of other large towns in Malaya.

The Twelfth Malayan Exhibition.

In the last number of this Journal we published the speech which His Excellency Sir Shenton Thomas delivered when opening the Malayan Exhibition on August 3rd. In the present number will be found a general account of the main features of this Exhibition.

It is a very common experience that a successful exhibition is a financial failure. We are glad to note that the Malayan Agri-Horticultural Association, which with some difficulty but with success weathered the storm of the recent trade depression, has, however, always run its annual exhibition at a profit. The recent venture, although larger than its predecessors, and therefore entailing a greater capital outlay, was a financial success, due partly to the fine weather experienced, but also to the increasing popularity of these exhibitions amongst exhibitors and visitors.

A return to prosperity in Malaya will doubtless react favourably on the finances of the Association and enable it to stage exhibitions on a still more ambitious scale, but it is possible that future exhibitions during prosperous times will not have a more valuable influence in the country than did its exhibitions which supplied an incentive, and inspired a spirit of hope during the worst days of the depression.

Original Articles.

DISEASES OF THE POTATO PLANT AT CAMERON HIGHLANDS

BY

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Introductory.

The climatic conditions on the plains in Malaya are unsuited to the growth of the potato plant (*Solanum tuberosum* L.), but at elevations of about 3,000 feet and upwards it is possible to grow potatoes throughout the year. At Cameron Highlands, in Pahang, cultivation of this crop is a not unimportant enterprise on many of the holdings which have been opened up during the last few years.

In colder countries, where this important food plant is extensively grown, a mass of information is available regarding the methods to be adopted and the precautions to be observed when this crop is cultivated.

Potato cultivation is still largely in the experimental stage in Malaya, and authoritative information is not yet available. It is becoming evident, however, that the question of control of diseases is likely to be of as much importance locally as it is in all potato-growing countries.

The potato crop is attacked by numerous diseases, of which about twelve are of considerable importance. For example the well-known potato blight, which in 1845-46 caused the destruction of the entire crop in many countries, is an ever-present menace. This disease has now been recorded at Cameron Highlands and has already done considerable damage. In addition, two other diseases have been recorded, of which one merits attention.

Accounts of the diseases recorded at Cameron Highlands and of some other diseases which are likely to appear, are given below.

Blight caused by *Phytophthora infestans*.

This disease was first recorded towards the end of 1934 on several holdings where it attacked plants grown from tubers purchased locally and from tubers imported from Brastagi in Sumatra.

Another outbreak occurred at the Experiment Station, Tanah Rata, in May 1935, on plants grown from seed tubers imported from Canada. On this occasion the disease was first noticed, on May 14th, on a few plants in two areas which had been planted four weeks previously. The varieties planted were: Green Mountain, Netted Gem, Irish Cobbler and Up-to-date. These varieties, therefore, are not resistant to blight under local conditions.

The plants had previously received one application of a fungicide (Burgundy mixture) but, owing to rain (0.45 in.) which fell within a few hours after spraying, the fungicide did not give adequate protection, since much of it was washed off the leaves.

The disease progressed rapidly during the wet weather experienced after the 21st May and by the end of May had killed practically all the plants in the two areas. The plants had formed small tubers and, although these had not been badly attacked, some of them were already infected.

Description of the Symptoms of Blight.

The disease as a rule first appears on the lower leaves in the form of dark brown or black spots (or lesions) of irregular shape and size. On the under surface of a leaf, beneath a lesion, a white mould can usually be seen at the margin of the lesion. The petioles, stems and blossom pedicels may also be attacked and similar lesions may be formed.

The lesions enlarge, particularly when weather conditions are favourable to the fungus, and the whole plant may blacken and die, giving off a characteristic odour. If dry sunny weather intervenes shortly after infection has occurred, the rapid progress of the blight may be arrested.

The tubers are also affected by the disease and develop rusty-brown, slightly shrunken spots or markings just beneath the skin. The tubers become infected mainly by motile spores formed by the sporangia of the fungus. The rot caused by the fungus in the tubers is normally a dry rot, but under moist conditions secondary organisms may enter and the tubers may disintegrate with a wet rot. If a diseased tuber is cut open before secondary rots have occurred, the rusty-brown markings will be evident in the flesh immediately underlying the skin. (See illustration).

The Fungus.

If a portion of a diseased leaf, on which the mould on the under surface is visible, is examined under a microscope, the mycelium and spores (sporangia) of the fungus can be readily identified.

(The fungus did not grow in artificial cultures set up at Kuala Lumpur from material obtained from Cameron Highlands, presumably owing to the higher temperature. The fungus, however, was identified as *Phytophthora infestans* by the typical nodular swellings in the branched sporangiophores, and by the shape and size of the sporangia present on the diseased leaves.

The sporangia are invert pear-shaped, and are formed on slender, branched stalks which emerge through the stomata of the leaf. The following records of size were obtained from 50 measurements.

mean length 30.63 microns.
mean width 17.47 microns.
range 19.80—49.50 x 13.20—23.10 microns.

The sporangia are produced in enormous numbers, and can be carried by wind, or on bodies of insects, thus spreading the disease. If a sporangium alights in a drop of moisture left by rain or dew on a potato plant, the

protoplasm of the sporangium is capable of splitting up into six or twelve, small, motile bodies (zoospores) which escape from the sporangium and swim about in the water by means of cilia. These zoospores soon come to rest and germinate, each producing a germ tube which penetrates into the plant and forms mycelium within the tissues. Sometimes the sporangia germinate directly without forming zoospores.

The sporangia are thin-walled and are quickly killed in the absence of moisture, or at temperatures above 80°F.

Many species of Phytophthora produce thick-walled, resting spores called oospores. Oospores of *P. infestans* are developed in artificial culture, but their occurrence in the field has not been observed.

According to several authorities who have studied the fungus in detail, temperatures between 50°F and 57°F favour germination and infection. The growth of the mycelium in the tissues of the plant is most rapid between 70°F and 77°F. The optimum temperature for the production of sporangia (*i.e.* dissemination) is 70°F, but sporangia can be produced between 38°F, and 79°F.

Germination of the sporangia, resulting in dissemination of the disease, is dependent on humid conditions brought about either by heavy dews or by rain, accompanied by suitable temperatures.

If the temperature ranges mentioned above are accepted as being applicable to the requirements of *P. infestans* under local conditions at Cameron Highlands, it would appear that the menace of potato blight will be present at any period during the growth of a crop, if wet weather intervenes.

The mean temperature at Cameron Highlands is about 65°F. (mean max. 72° : mean min. 56°), and the rainfall (and humidity) is normally sufficient for propagation of the fungus during most months of the year, particularly in April, May, and October to December, infection taking place at night and growth of the fungus mycelium in the tissues and production of sporangia occurring during the day.

It is interesting to record that *P. infestans* has been recorded in Java only at altitudes over 5,000 feet, but has not been recorded at altitudes of approximately 4,000 feet. According to Butler (4) the disease does not occur where the mean temperature exceeds 77°F.

Sources of Infection.

It has been established that the disease can originate from infected tubers planted as seed, and possibly the disease was first introduced into Cameron Highlands on potatoes imported from abroad for seed purposes by a grower or obtained by growers from local shops or markets.

Phytophthora infestans has also been recorded in other countries on tomato, egg-plant, petunia and some other members of the Family Solanaceae, but so far it has only been recorded on the potato plant in this country.

There is every likelihood, however, that it is by now established on host plants other than the potato at Cameron Highlands, thus providing continual

sources of infection for the potato crop in localities where alternative host plants exist. Potato plants growing as weeds from discarded tubers, or tubers not extracted when the crop is lifted, as well as discarded stalks left lying from an earlier crop, may be potential sources of propagation and maintenance in a climate where there is no cold weather season to suppress the active growth of the fungus.

Control Measures.

Prevention of the disease is the most important measure to be attempted. It is an established practice in potato-growing countries to spray the plants with a suitable fungicide and by this means the damage caused by *P. infestans* has been largely minimized. Spraying, however, is not by any means the only measure which is considered to be necessary in dealing with the disease, particularly at Cameron Highlands, where growth of vegetation continues all the year round. The adoption of other measures in addition, especially sanitary measures, will help to check blight and other diseases as well as pests.

Preventive measures may be summarized as follows:—

1. When lifting the crop, avoid leaving any tubers in the ground, and do not permit "wild" potatoes to grow anywhere in the area, or in refuse dumps near quarters or coolie lines.
2. Burn the stalks after harvest.
3. Do not use for seed any tubers harvested from an area in which blight has occurred.
4. If the tubers are cut open before planting, signs of infection will be more apparent. Infected tubers should be dropped into a bucket of disinfectant and the knife disinfected before using it again.
5. When possible, use seed certified as apparently free from disease, and grown in an area where disease has not occurred.
6. Avoid planting in areas where sunlight is obstructed, and where mist is liable to be slow in dispersing.
7. Avoid planting too closely, and encourage air circulation by keeping down weeds and undergrowth in and near the beds.
8. Do not plant tomatoes in proximity to potatoes or in rotation with potatoes, and do not neglect signs of disease in any tomatoes in the neighbourhood.
9. Do not go to and fro between a diseased area and a healthy area, and do not use cultivation implements in a healthy area if they have been recently used in a diseased area until they have been disinfected (*e.g.* washed in Izal 1 per cent.).
10. Keep the developing tubers well covered with soil.

11. Experiment with varieties said to be resistant to blight,* bearing in mind that a variety resistant in other countries may not be resistant under local conditions, and note for future planting any good varieties which indicate resistance.
12. Begin preventive spraying early.

Prevention of the Disease by Spraying.

It remains to be seen whether spraying with a fungicide will give as good results in prevention and control of the disease under local conditions as have been achieved elsewhere.

According to Muskett and Cairns† who tested various fungicides, Burgundy mixture is the most effective for use against Potato Blight. Plots sprayed with this mixture gave an increased yield over the control of nearly 2 tons per acre, at a cost of 15 shillings per acre for 3 applications, each at the rate of 120 gallons per acre.

Burgundy mixture is more suitable for use in this country than a similar fungicide—Bordeaux mixture—since freshly burnt quick-lime is required in the preparation of the latter mixture and supplies of quick-lime are not always available.

Burgundy Mixture.

Copper sulphate	...	4 lbs.
Washing soda (crystalline sodium carbonate)	...	5 „
Water	...	40 gallons.

(1) Dissolve 4 lbs. of copper sulphate in 5 gallons of water in a wooden barrel or earthenware "tong" (iron, zinc or galvanized vessels *must not* be used) capable of holding 40 gallons. When dissolved, add water to make up to 35 gallons.

(2) In another vessel dissolve 5 lbs. of washing soda in 5 gallons of water.

(3) When the soda is completely dissolved, pour the solution slowly into the copper sulphate solution stirring it vigorously all the time.

This mixture, if properly prepared, will be bright blue in colour, and 40 gallons should be sufficient to spray about 1/3rd of an acre of leafy potato plants. Although the two solutions will keep if not mixed, the mixture must be used immediately as it will not keep; it should be stirred periodically while in use. Before mixing the two solutions it is advisable to ensure that the spraying apparatus is clean and in good working order. Clean water must be used and the mixture should be poured into the sprayer through the gauze strainer supplied, otherwise the nozzles are liable to get choked and the work will not be done efficiently. Sprayers should be cleaned thoroughly after use.

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* *e.g.* The President type (Iron Duke, Scottish Farmer): Irish Chieftan: Epicure: King George: Kerr's Pink: Incomer.

† *Journ. Minist. Agric.* N. Ireland. 2. 1929: and 3. 1931.

The object of spraying is to cover the vegetative parts of the plants with a thin covering of fungicide applied in a fine mist, so as to prevent infection.

If heavy rain occurs after spraying the work must be repeated. One application is insufficient owing to the production of new growth on which no spray has been deposited. It may be found necessary to spray at frequent intervals to secure adequate protection.

Up to the present, the outbreaks of blight reported from Cameron Highlands have appeared within 4 to 6 weeks after planting. It is important, therefore, to spray early and certainly before the fourth week.

Spraying should be done in the early morning or in the afternoon, in order to minimize the risk of the burning effect of hot sun on wet foliage.

It is most important to spray the under surfaces of the leaves as well as the upper surfaces and the stalks. The work should be supervised in order to ensure this being done.

Study of the rainfall records at Cameron Highlands from 1931 to 1934 indicates that, in general, drier weather may be expected from January to about the middle of March and in June and July and the early part of August. It is possible therefore that, in normal years, the disease would be less likely to become epidemic if the seed were planted so that the main growing period fell in the drier months.

The question of the possibility of avoiding the disease by growing potatoes at lower altitudes on the Highlands where the temperature is higher, might repay investigation.

Bacterial Wilt.

This disease has occurred on potatoes at Cameron Highlands, and has been recorded from many countries where the temperature is normally high. It has been reported as causing serious losses of the potato crops in the Netherlands Indies and in India, and in the case of one outbreak at Cameron Highlands, all the plants in an experimental plot were killed by this disease.

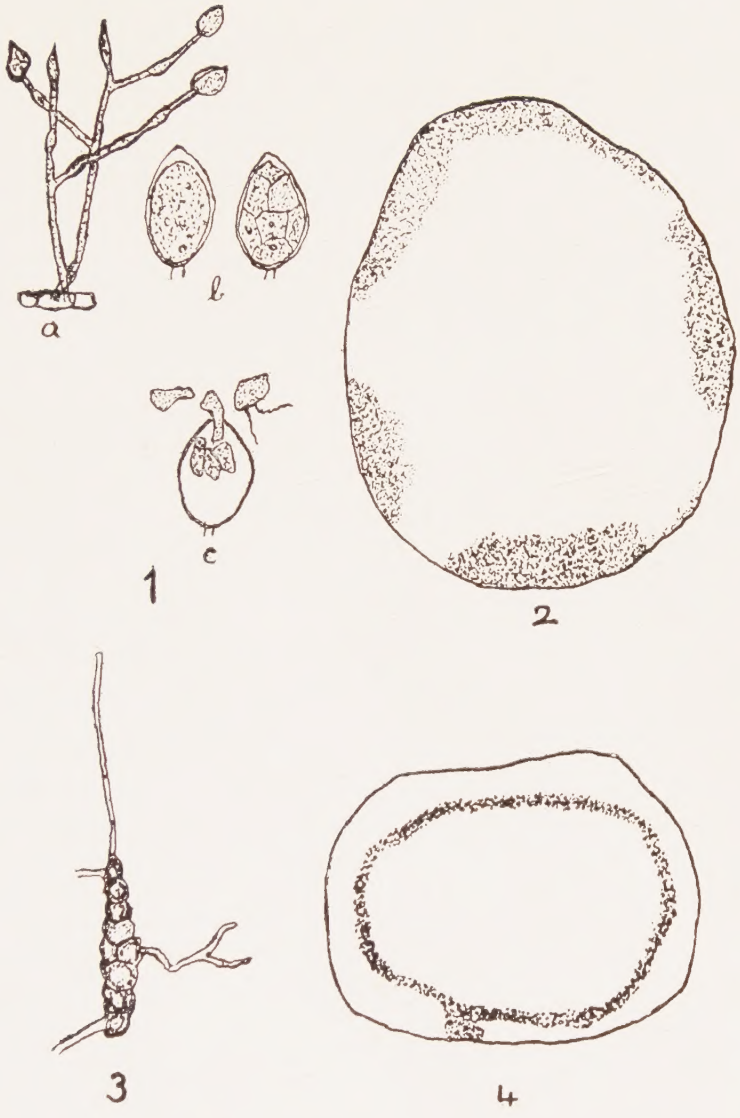
The disease is also known under the names of Slime Disease, Ring Disease and Brown Rot. It is caused by a soil bacterium (*Bacterium solanacearum* E.F. Smith.).

The organism is also the cause of the well-known wilt of tobacco and tomatoes in the Eastern tropics.

Symptoms.

Affected plants wilt rather suddenly, the lower leaves, as a rule, drooping first, followed within a few days by the collapse of the whole plant, which in damp weather may disintegrate with a wet rot.

The stems, roots and tubers are invaded by the organism. The vascular ring in the stem is usually brown in colour and the vessels are plugged with bacterial slime and cannot function.



EXPLANATION OF PLATE.

FIG. 1. *a.* Sporangiophores and sporangia of *Phytophthora infestans.*
b Sporangia (enlarged) showing segmentation of protoplasm.
c. Liberation of zoospores.

FIG. 2. Diagram of cut tuber showing the markings due to *P. infestans.*

FIG. 3. Germinating spore of *Macrosporium solani.*

FIG. 4. Diagram of cut tuber showing the ring of discoloured tissue due to infection by *Bacterium solanacearum.*

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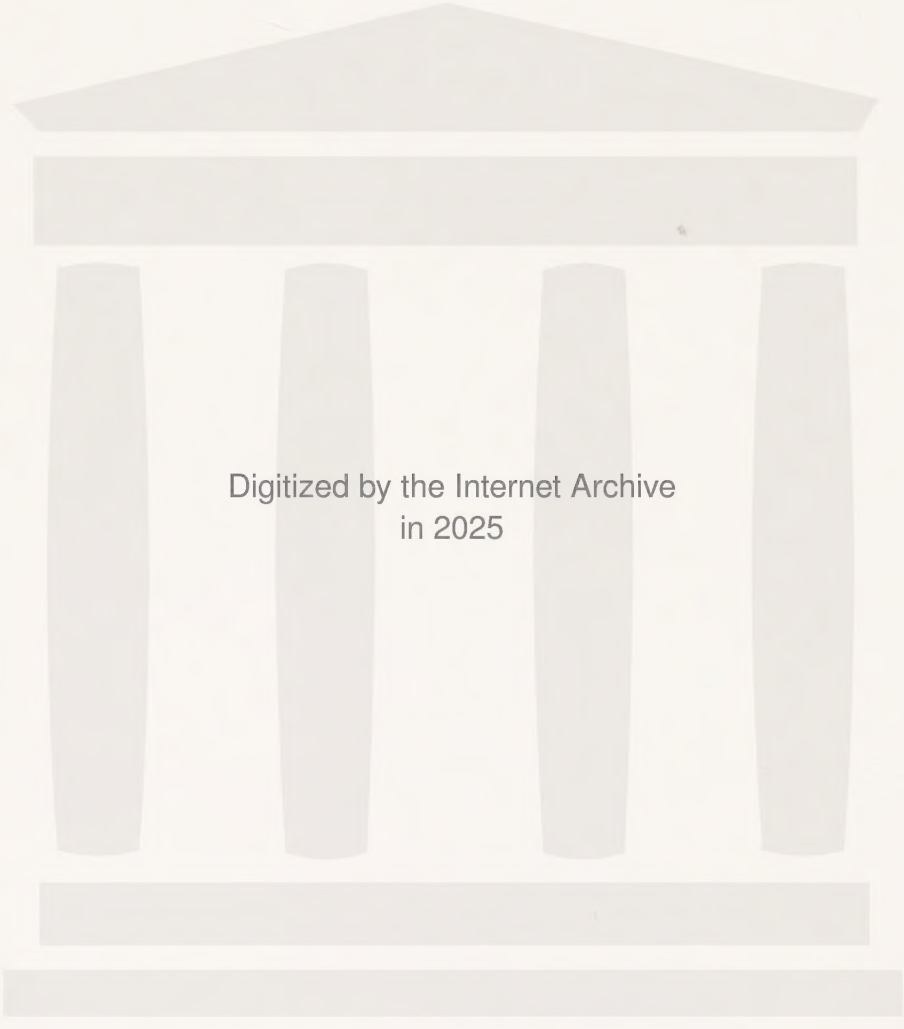

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In the tubers the infection enters by way of the stolon and, in time, the ring of vascular tissue in the tuber becomes invaded by the bacterial slime. If an infected tuber is cut open, a brown ring is usually found in the flesh about $\frac{1}{10}$ or $\frac{1}{5}$ of an inch below the surface. Within an hour after cutting, a white or cream coloured slime exudes from the brown ring. A similar slime may exude from the vascular ring in a cut stem. If a drop of the slimy exudate is examined under a microscope it will be found to contain millions of bacteria.

If plants are attacked early in the period of growth they are usually killed before tubers are formed. If, however, the disease does not appear until late some of the tubers which have formed may be edible. Tubers even slightly affected have an unpleasant flavour.

Factors contributing to Infection.

The disease can be carried in tubers used for seed, in which the organism is dormant. Such tubers may sprout and growth may continue for a period, but the disease can pass from the tuber into the roots and stems and cause the plant to wilt. The disease may then spread quickly to adjoining plants.

The soil in which the disease has occurred becomes infected and subsequent crops of potatoes in this soil are liable to be badly attacked.

The soil may also become infected as a result of attack by the organism on other susceptible plants. Tobacco, tomato, brinjal, groundnut, arrowroot, and solanaceous weeds or flowers are all susceptible, and should not be grown in rotation with potatoes.

Plants may be attacked at any stage in their growth, infection occurring more rapidly in plants the roots of which have been injured by cut worms, nematodes or by other agents. Wet weather and badly-drained soil are other factors which appear to favour the progress of the disease.

The Organism.

Bacterium solanacearum inhabits the soil, in which it is able to persist for years. In pure culture on artificial media it soon loses its virulence; but in the soil, virulence can be maintained for years, probably because of the numerous host plants, some slightly and others very susceptible to its attack, which, growing as weeds or as a cultivated crop, maintain the virulence of the organism.

It is the practice in tobacco cultivation in Sumatra to grow *Mimosa invisa* for as long as seven years on infected soil in order to reduce the virulence of the organism which does not attack the Mimosa, while the latter smothers out other undesirable, susceptible plants.

Treatment.

If the disease does not appear until late in the growth of the plants, the tubers should be harvested as soon as they are fit to dig since many of them

may then escape bad infection and may be saleable. If left too long in the soil, the majority when lifted may be found to be rotten as a result of the disease.

Tubers taken from a plot in which the disease has appeared should not be used for seed, and should not be kept for any length of time. When harvesting, the stalks should be collected and burnt and all the tubers should be lifted and stored, after drying, in a cool, dry place. Any tubers showing obvious signs of a disease should be removed before storage and the stored potatoes should be inspected periodically so that decaying tubers can be removed during the period of storage.

Solanaceous crops or groundnuts should not be grown in rotation with potatoes, and land on which potatoes have been grown should not be planted with potatoes again for some years. It should lie fallow under *Mimosa invisa* or be planted with non-susceptible plants and kept free from weeds. Hill padi, maize, tapioca, sweet potatoes and grasses are not susceptible to the disease.

It is advisable, before planting, to cut the seed potatoes lengthwise into two and to have a bucket of disinfectant handy into which diseased tubers (particularly those showing a brown ring in the flesh or the rusty brown markings of blight) can be dropped. The hands and knife should be disinfected, after cutting a diseased tuber before the next one is cut. The cut surfaces of the tubers should be exposed to dry air under shelter for one or two days before planting, and it is advisable again to inspect them for disease before they are planted. The floor of the shelter should be clean and not contaminated with the disease.

It is sometimes advantageous to steep seed potatoes in a disinfectant before planting, and, in connection with control of this and other diseases, surface sterilization of *uncut* tubers, by immersing the tubers in weak formalin solution, would help to kill undesirable organisms adhering to the exterior. Half a pint of commercial formalin in ten gallons of water is a suitable steeping solution. The tubers may be immersed in this solution for three minutes, removed and covered with clean sacking for 2 hours and then dried. Another useful steeping solution is a 1 per cent. solution of corrosive sublimate; the tubers (*uncut*) should be dried quickly after immersion in this solution in which they may remain for about one hour. Steeping, however, will have no effect on the infection within the tuber.

Leaf Disease caused by *Macrosporium solani.*

This disease is not of such importance as the two diseases described above, yet in wet weather and on backward plants it can cause appreciable damage.

The disease is sometimes called "Early Blight" or "Target Spot".

Symptoms.

The disease usually starts in patches where growth is poor. The lower leaves are normally the first to be attacked by the fungus which causes dark brown, circular or oval lesions to develop. The stems may also be affected by similar lesions but not as a rule to the same extent. Under conditions favourable to the fungus, the lesions enlarge and later the brown spots become concentrically zoned by ridges and furrows giving a target-like appearance. The disease usually appears when the plants are 4 to 6 weeks old. The growing tubers are not directly attacked by the disease, but tubers formed on attacked plants are often small and deficient in starch. The fungus can also cause a rot of potatoes in storage, or in transit.

The Fungus.

The disease is caused by a fungus formerly known as *Alternaria solani*, but now more generally referred to as *Macrosporium solani* E. & M. It is not a vigorous parasite and usually only attacks plants showing poor growth, but if the weather is very wet, vigorous plants may also suffer.

The fungus can live saprophytically on old potato-stalk refuse, and as it also attacks various solanaceous plants, (*e.g.* tobacco, tomato, egg, plant, datura) it may be present all the year round at Cameron Highlands.

Long, tapering, septate, muriform spores are produced, from the fungus mycelium within the leaves, on the lesions both on the upper and lower surfaces of affected leaves and spread the infection to other plants. It has also been shown that the spores can remain alive for a period in the soil and can infect the leaves if splashed on to them during rain.

Control.

The spraying measures recommended for control of blight are also applicable to control of this disease. Susceptible weeds should be eradicated and spraying should be thorough, and applied frequently so as to keep the newly-formed leaves covered with the fungicide. Vigorous growth should be encouraged and crop rotation practised.

Notes on Diseases not yet recorded at Cameron Highlands.

In addition to the diseases described in the foregoing pages there are several diseases which have not yet been recorded, but which may possibly make their appearance. The most important of these diseases are Wart disease, Leaf curl, Mosaic disease, Scab.

Wart Disease caused by the Fungus *Synchytrium endobioticum.*

This disease is very destructive to the tubers, which become distorted and covered by warty excrescences or tumours which may swell to a size larger than the infected tuber.

It is stated that this disease does not occur in soils in which the temperature is above 72°F. and possibly the soil temperatures at Cameron Highlands (average about 69°F. at 1 foot) may be unsuited to vigorous growth of the fungus.

In colder countries, wart disease is as serious in its effects as blight, and in addition, the soil in which it has occurred becomes infected with long-lived spores so that only varieties of potatoes immune to the disease can be grown in that soil.

Leaf Curl or Leaf Roll.

This disease is known in all countries where potatoes are cultivated. Affected plants are not killed, but are stunted in growth and give low yields of small tubers. The disease is not due to the attack of any parasitic organism but is of the nature of an infectious virus disease, which can be carried from infected plants to healthy plants by sucking insects. Tubers from diseased plants are infected and, if used for seed, produce plants with characteristic symptoms of the disease.

If healthy plants become infected in the field, they may not show any marked evidence of infection, but their progeny will develop the disease the symptoms of which are a rolling upward and inward of the margins of the leaves. This usually begins in the lower leaves, gradually appearing in the upper leaves. The leaves feel hard and crisp to the touch and make a rattling sound if knocked together and frequently point upwards at an acute angle. In some varieties, a reddish or purplish colour may also develop in the leaves.

The only method of avoiding this disease is to use healthy tubers for seed. Frequently, small tubers are kept for seed and, if the disease has occurred and has not been recognized, the small tubers from diseased plants may be selected for seed so that the seed for the next crop may contain a large percentage of infected tubers and the resultant crop will be negligible. It is important, therefore, to collect seed tubers from an area free from the disease, and to reject for seed any tubers grown in a plot where the disease has developed, bearing in mind that a plant infected late in growth may not show symptoms of the disease but can nevertheless produce infected tubers which are normal in size. In areas intended for seed collection, infected plants and their tubers should be removed as soon as any signs of the disease are noticed, and, as a precaution, the plants immediately adjoining a diseased plant should also be destroyed.

Mosaic Disease.

This disease also is a virus disease and can cause a serious reduction in yield if the attack is severe. Plants affected with mosaic disease are frequently dwarfed and the leaves become crinkled and mottled in varying shades of green. The infective principle or virus, present in the sap, is normally transmitted by sucking insects. Tubers from infected plants produce diseased progeny and should not be used for seed.

The control measures recommended in the case of leaf curl disease are also applicable to mosaic disease.

Scab.

This is a disease of the tubers, particularly prevalent in light soils lacking in humus and having an alkaline reaction. The disease is caused by certain species of a soil inhabiting fungus—Actinomyces. When the fungus attacks a tuber, corky tissue develops at the infected spots, confining the infection of the superficial layers, and scabs are formed on the skin. Although the deeper tissues of the tuber are not affected, the tubers are rendered unsightly, their market value is depreciated, and they do not keep well in storage.

Scab has not been recorded in this country, but it is said to be prevalent in Java and Sumatra. Species of Actinomyces are known to be present in Malayan soils, but the soils at Cameron Highlands, having an acid reaction, may not prove suited to active growth of the fungus as a parasite.

For the control of scab it is recommended to dig in vegetable organic matter just before planting, and to avoid the use of lime, ashes and soot on alkaline soils. Scabbed tubers should not be used as seed and scabbed potatoes or peelings should not be used in manure or be fed, uncooked, to animals such as pigs, in case the litter and manure should become contaminated. Steeping the tubers intended for seed, in corrosive sublimate soon after lifting, may also be found beneficial.

Summary.

1. Three diseases which have appeared in the potato crops at Cameron Highlands are described, and measures for prevention and control are given.
2. These disease are:—(a) "Blight" caused by *Phytophthora infestans*; (b) "Bacterial wilt", "slime disease" or "Brown rot" caused by *Bacterium solanacearum;* (c) Leaf disease or "Target spot" caused by *Macrosporium* (*Alternaria*) *solani.*
3. Four common diseases, not yet recorded locally, are described briefly; control measures are suggested.
4. These diseases are (a) "Wart disease"; (b) "Leaf Curl" or "Leaf Roll"; (c) "Mosaic disease"; (d) "Scab".

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INDIAN BUFFALOES IN KUALA LUMPUR DISTRICT AND ENVIRONS

BY

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Introductory.

An enquiry has been undertaken in order to obtain preliminary data regarding the production of milk from Indian buffaloes in Kuala Lumpur district and environs. To conduct the enquiry fully would take a considerable amount of time and it was necessary, therefore, to restrict investigations to parts of Kuala Lumpur, Sungei Besi and Serdang.

Buffalo keeping for milk production is in the hands of the Punjabi. In the last census, the Punjabi race totalled 6,328 in Selangor. The milk of the Indian buffalo and its by-products form an important part of the food of this race.

The Indian Buffalo and some of its Characteristics.

The Indian buffalo, *Bos bubalus,* is closely related to the small number of wild buffaloes occurring in parts of India and Ceylon.* The domesticated animal is represented by a number of distinct breeds with excellent qualities as milk producers under tropical conditions. The Indian buffalo is semi-aquatic by nature and during the heat of the day will take to water, if ponds or mud-holes are available. It is, however, a very hardy animal, being immune to many bovine diseases and able to thrive on coarse fodder and to withstand rigorous climatic conditions.

Two breeds are met with locally, the "Murrah" and the "Surti". The Murrah is the predominating breed and is considered the best milking animal in India. It is readily adaptable to varying climatic conditions and thrives well in Malaya. Animals of this breed are usually jet black in colour, but quite a number of brown animals are seen. The hair is scanty, the skin smooth and polished. The animals are short-necked, short-legged and heavy boned. The horns are its distinguishing feature, being short, thick, and much curled.

The Surti breed are medium-sized animals, of uniform size and with short legs. The skin is black and the hair whitish-grey, particularly from the knees and hocks downwards. Occasionally a white strip occurs beneath the neck. The horns may be either long or short taking a downward and backward, then upward and frequently inward direction, until the tips nearly meet over the neck.

Animals of these two breeds are generally tractable and easily handled. Both breeds are stated to have been originally imported from the Punjab in small numbers to meet the requirements of Northern Indians in this country.

* The Indian Buffalo as a Milch Animal. *Agriculture and Live-Stock in India,* Vol. V, Part I, p. 47.

Three-year old Heifer in calf, Murrah breed.

TYPICAL EXAMPLE OF SURTI BREED.

Breeding.

There is little control over breeding. The general practice is to select a promising bull calf for service with a herd of 20 to 30 cows. The bulls are fit for service when 2½ to 3 years old. A four-years old bull is sufficient for a herd of 30 cows. The price of such an animal varies from $100 to $150.

It is considered that the stud efficiency of a well-cared for bull continues until the eighth year, after which a decline occurs and the animal is sold for slaughter. Since religious scruples prohibit the direct sale of animals to the butcher, the transaction is made through Chinese or Malays.

The heifers are allowed service when three years of age and the animals calve after a gestation period of about 10½ months. It is stated that buffalo cows will continue to bear calves until 20 years of age. There is little market for the disposal of young stock, but mature bulls are occasionally bought by Chinese for hauling jungle timber. The Punjabi do not castrate young bulls but this operation is sometimes performed by Chinese. The period of oestrum takes place about every 30 days, and may occur either one month or two months after calving. Indian buffaloes continue in milk for a period of up to 10 months. In the absence of records it is difficult to estimate the yield of milk obtained locally but it is considered to range from 3,000 lbs. to 5,000 lbs. per lactation. During the first months after calving the daily yield varies from 20 to 30 pints per cow. The Murrah breed are considered to be more prolific milkers than the Surti breed. Good milch cows are valued locally at about $250.

During the course of the enquiry a herd of cross-bred buffaloes (Malayan x Indian) was seen. These animals were stated to produce milk containing a very high percentage of butter-fat, but were inferior to the pure Indian breeds in respect of yield of milk.

The Murrah buffalo is considered superior to the Malayan or Siamese buffalo as regards quality of meat, and commands a premium of $5 to $10 over the latter.

Feeding.

The herd is driven out in search of pasturage at day-break and may cover a distance of three miles before the feeding ground is found. As the morning advances the animals are allowed to wallow, or are soused by the herdsmen with several pails of water from the nearest pond. At about 11 a.m. the herd returns home. On arrival at the stall, the animals are tied up and remain under shade during the heat of the day. The herd is again taken out for grazing at 3 p.m. and returns for the night usually after dark. Milking is undertaken early in the morning and again before the animals leave for the afternoon grazing. The milking cows receive a ration of concentrates, but it is usual for the remainder of the herd to subsist mostly on grazing and cut fodder placed in the shed. Broken rice, rice bran, gingelly cake, and mustard cake are fed in varying proportions. Coarse salt is always added to the concentrates. The following are typical examples of rations fed locally.

A — *Ration fed to Buffaloes in full milk.*

Concentrate.		Quantity.	Cost in cents.
Broken rice	...	2 lbs.	6.00
Rice bran	...	$1\frac{3}{4}$ „	1.40
Gingelly cake	...	$2\frac{1}{4}$ „	3.80
Salt	...	2 ozs.	.30
		Cost per day	11.50 cents.

B — *Ration fed to Dry Buffaloes.*

Rice bran	...	$\frac{3}{4}$ lb.	.60
Mustard cake	...	$\frac{1}{4}$ lb.	1.00
Salt	...	1 oz.	.15
		Cost per day	1.75 cents.

The ration is prepared by boiling the broken rice and making it into *kanji**. The gingelly cake is allowed to soak in water to form a thick paste. To this is added rice bran and salt. Mustard cake sometimes replaces gingelly cake. The whole food is well mixed with the *kanji* and diluted with water at the rate of 5 lbs. of concentrate to 2 gallons water. The quantity of concentrates fed to milking cows ranges from 3 to 5 lbs. per animal per day. Dry cows may receive 1 lb. of concentrate only.

Calves receive milk and rice *kanji* up to the age of 10 months. After weaning, the young stock are fed with small quantities of mustard cake in addition to cut grass and what fodder they may obtain whilst grazing. Mustard cake is specially imported from Calcutta for use in feeding buffaloes.

Housing.

Sheds built of jungle timber and roofed with *ataps* are provided to shelter the herd. Frequently the shed is an extension of the dwelling house occupied by the herdsman and his family. The floor is constructed of hard clay sloping to the outside of the shed. The animals are stalled head to head on two sides of the building with a feeding trough running down the centre of the shed. The initial cost of a building sufficient to house thirty head of buffaloes varies between $75 and $100. An open yard for tethering the herd is commonly provided in front of the shed. On fine nights the animals may be allowed to remain tethered to posts in the open air. In Kuala Lumpur district a ready sale is found for the dung which is allowed to accumulate in a heap adjoining the dwelling, often in a conspicuous position.

Disease.

The Indian buffalo is resistant to most diseases, and sickness rarely occurs, except in outbreaks of serious contagious diseases *e.g.* rinderpest. The calves and young stock are susceptible to outbreaks of *haemorrhagic septicaemia,*

* *Kanji* = rice gruel.

which is guarded against by keeping them under shade during the hottest part of the day.

Dairying.

Milking is done twice daily, usually at 3 a.m. and 2 p.m. The calves are allowed to suckle the mother to help the secretion of milk. The yield varies from 20 to 30 pints per day gradually diminishing with the advance of lactation. After the milk is drawn it is strained through a piece of cloth to remove foreign substances. The milk is transported in closed cans on bicycles by the herdsman or a member of his family. The greater part of the buffalo milk produced is consumed by Northern Indians but other races are beginning to use it owing to its comparative cheapness. The present selling price is 8 cents per pint. Some milk vendors arrange the entire sale of their milk to coffee-shop keepers who purchase it in bulk. An adult Punjabi normally consumes at least a pint of buffalo milk per day in addition to the use of *ghee*.

Buffalo milk is characterized by a high proportion of butter fat. The solids other than butter fat are also higher than in the case of ordinary cow's milk. In India, the average fat percentage in buffalo milk varies between 7.7 to 8.3, while cases of 9.5 to 10 per cent. are common. The following data, supplied by the Institute for Medical Research, show the analysis of buffalo milk sold in Kuala Lumpur :—

Analyses of Bulk Samples of Buffalo Milk.

No. of Sample.	Specific Gravity.	Percentage Butter fat.	Percentage Solids not-fat.
1	1,032.8	7.50	9.84
2	1,033.3	7.25	9.92
3	1,031.8	8.60	9.81
4	1,031.9	8.10	9.74
5	1,031.8	7.75	9.64
6	1,032.0	7.60	9.66

There is considerable variation in quality of milk from individual buffaloes as the following analyses show :—

Analyses of Milk from Individual Buffaloes.

No. of Sample.	Specific Gravity.	Percentage Butter fat.	Percentage Solids not-fat.
1	1,036.0	4.65	10.07
2	1,032.3	7.30	9.68
3	1,030.9	8.90	9.65
4	1,033.8	5.55	9.70
5	1,030.0	10.80	9.80
6	1,029.9	11.00	9.82

Manufacture of Ghee.

Milk unsold, is made into ghee or clarified fat which is one of the essential food requirements of the Punjabi race. Ghee is prepared locally in the following manner :—The milk is well boiled in an earthenware pot and, after cooling, a few drops of butter milk are added as a starter which causes natural souring. This continues for a day or two. The curd, together with a small quantity of water, is then placed in a broad-bottomed earthernware vessel and agitated by a wooden spindle which is whirled round between the palms of the hands. The butter globules float on the surface and are collected. After extraction, the butter globules are heated over a fire until all water has evaporated. Upon cooling, the ghee solidifies and is white in colour. Trials demonstrated that one gallon of buffalo milk containing 7 per cent. butter fat, yielded ½ lb. ghee, valued locally at 70 cents per lb. It is stated that buffalo ghee is imported from Calcutta in considerable quantity and retailed at 90 cents per lb. Ghee is usually made from surplus milk, but where a herdsman lives some distance from a town and the milk output is low, frequently the entire yield of milk is converted into ghee.

CUBE OR HAIARI ROOT

BY

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The increasing demand for non-poisonous insecticides has directed attention to utilizing various fish poison plants known to natives in different parts of the world. Frequent reference is made in recent literature to the use of Haiari root by the Indians in South America. Information has become available that this root is being cultivated in Peru, and that exports of cube root from that country to the United States of America are increasing. It is stated that commercial shipments of cube have proved to be of satisfactory toxic value, the rotenone content ranging from 4 to 6 per cent. with ether extract 12 to 18 per cent. It appears that a large demand exists for powdered root as an insecticide provided that ample supplies of uniform quality and moderate price are available.

In November, 1932, several living plants of both Black and White Haiari were received by the Department of Agriculture at Kuala Lumpur from the Royal Botanic Gardens, Kew, the original source of the material being British Guiana. These plants must, for the present, be known as *Lonchocarpus* spp. since it is reasonably certain that they represent two distinct species belonging to this genus. The plants were transferred to the Central Experiment Station, Serdang, in January, 1933, and planted in open beds during the following month.

It has so far only been possible to obtain material for propagation of White Haiari, the growth of Black Haiari having been slow. Branches of the former type, pegged down below the soil, root readily and become established without difficulty. Stem cuttings of strong mature wood will root under shade, but insufficient material has so far been available to test this method except on a small scale.

A short description of the two plants, taken from specimens growing at Serdang is appended :—

White Haiari.—A large rambling climbing shrub, evidently ascending to some height under natural conditions. As the plant grows the stems fall over and trail on the ground. Mature stems smooth, whitish in colour; immature foliage reddish-brown. Leaves compound, 12 inches long or more, leaflets 7 or 9, 4 to 5 inches long with a short narrow point at the apex. Upper surface of leaflets dark green, glabrous; lower surface paler green than upper surface, with minute light-brown hair on the veins and reticulations.

Black Haiari.—An erect shrub-like plant, the stems not falling over and trailing on the ground. Mature stems dark brown to black in colour. Leaves compound, 12 to 18 inches long. Leaflets 7 or 9, 5 to 7 inches long, with a

prolonged narrow point at the apex. Upper surface of leaflets bright green, glabrous; lower surface paler than upper surface, with numerous minute light-brown hairs.

At the end of March, 1935, *i.e.* approximately 25 months after planting, a small quantity of root of White Haiari was removed from the living plant for the purpose of analysis. A sample of Black Haiari root was obtained a month later. The roots were fleshy and yellowish white in colour, with a cellular or spongy structure. It was observed that the root of White Haiari was produced in greater abundance than that of Black Haiari. Whereas in the former instance numerous roots were found just below the surface of the soil, the root system of Black Haiari was less superficial and appeared to penetrate to a greater depth.

The results of analysis of locally-grown White and Black Haiari root conducted by the Chemical Division are shown below: —

		Air-dry per cent.	Moisture-free basis per cent.
White Haiari.			
Moisture	...	11.25	—
Ether extract	...	6.80	7.66
Rotenone	...	0.73	0.82
Black Haiari.			
Moisture	...	13.50	—
Ether extract	...	6.85	7.92
Rotenone	...	2.57	2.97

It is to be noted that the rotenone content is considerably below that of good quality *Derris elliptica* root, which is commonly about 6 per cent. and also below that claimed for Cube as grown in South America. It appears possible that the samples of root harvested were immature, since the statement is made that the Indians consider the root unfit for use until between 3 and 4 years old. The possibility must not be overlooked, however, of clonal forms of *Lonchocarpus*, as have recently been found in the case of *Derris elliptica*.

The information here recorded should be considered as a preliminary report owing to the paucity of material available and the lack of definite information as to the stage at which the crop should be harvested to yield the maximum amount of toxic matter. The growth of both Black and White Haiari to-date has been good, especially so the latter, and there appears little doubt that these plants should prove amenable to cultivation in Malaya.

Miscellaneous.

TWELFTH MALAYAN EXHIBITION

BY

H. L. Barnett,

Secretary, Malayan Agri-Horticultural Association.

The Malayan Agri-Horticultural Association held its Twelfth Malayan Exhibition at Kuala Lumpur, during the August Bank Holidays, the 3rd, 4th and 5th August, 1935. Exceptionally fine weather continued throughout the Exhibition, and the total attendance of visitors was 30,036 as compared with 22,588 in 1934, and 20,093 in 1933.

The Exhibition was very considerably larger than the previous year's Show, necessitating greatly increased accommodation, and over 14,000 square feet of additional temporary buildings were provided. The general lay-out followed the lines of the 1934 Exhibition, and ample space was provided for the large crowds to view the exhibits without unnecessary congestion. An innovation was the provision of benches and shelters in the grounds for the convenience of tired sightseers.

The Opening Ceremony.

His Excellency Sir Shenton Thomas, K.C.M.G., O.B.E., Governor, Straits Settlements, and High Commissioner, Malay States, opened the Exhibition at 11 a.m. on the 3rd August, in the presence of a distinguished gathering which included their Highnesses the Rulers of Selangor and Negri Sembilan. His Excellency's speech was reported in full in the August number of this Journal.

Mr. F. W. Douglas, President of the Association, in calling upon His Excellency to open the Exhibition, spoke of the improved conditions of trade which have reflected favourably on the work of the Association. He also drew particular attention to the growth and success of the work of the Association in the organization of the All-Malayan Padi Competition and of the new feature this year of a special coconut section. After touching on the greatly improved financial position of the Association he paid a well-deserved tribute to the voluntary work performed for the organization.

The Hon'ble Mr. F. W. South, acting Adviser on Agriculture, and one of the Vice-Presidents of the Association, thanked His Excellency, on behalf of the Association, for the encouragement and support which His Excellency had given in several ways and especially in opening the Exhibition. After drawing attention to certain outstanding exhibits of an educational nature, Mr. South concluded by expressing the gratitude of the Association to Their Highnesses the Rulers for the valuable support they had given by consenting

to open in person various agricultural shows and padi competitions in their respective States, and to the officers of the Department of Agriculture who had been concerned in the organization of the All-Malayan Padi Competition.

Sections of the Exhibition.

The Exhibition as a whole comprised four distinct sections: the special coconut section, the competitive sections, Government departmental exhibits, and the trade section.

Special Coconut Section.

At previous exhibitions coconut products have figured incidentally in the list of exhibits in the Agricultural Section. This year, at the request of Government, following upon a recommendation of the Vegetable Oils Committee that special prominence should be given to the industry, it was decided to make coconut products a feature of the Exhibition.

With this end in view, a Committee was appointed to organize a special Coconut Section where all aspects of this important industry could be demonstrated to the public. This section occupied a separate hall wherein trade shows and instructional and competitive exhibits on an extended scale were arranged.

The aims of the organizers were as follows:—

(1) to encourage the further consumption of coconut produce in this country,
(2) to draw attention to recent industrial developments in Malaya,
(3) to foster the production of new commodities of commercial value and
(4) generally, to assist towards the economic betterment of the industry in Malaya.

With regard to the first item, a comprehensive display of village industries was arranged illustrating the numerous uses to which the various parts of the coconut may be put. In addition, a new competitive group for various articles of food made from coconuts was introduced and received a fair degree of support. The quality of the foodstuffs shewn left much to be desired and it is hoped that the book of coconut recipes* specially published by the Association, will foster the extended and improved use of the coconut in domestic cookery in this country.

Four stalls were occupied by commercial exhibitors for the display of their products and to illustrate the manufacture of coconut produce under factory conditions. Exhibits included a display of plant necessary for the production of household soap on a small scale, while a miniature oil mill and machinery for the manufacture of toilet soap were in continuous operation. In the competitive group the soap classes received many entries and a high standard was reached by the prize-winners. The factory oil and oil cake classes were numerically not so well supported, but it is interesting that the

* "Coconut Recipes" edited by Mrs. M. Dukes, price 30 cents.

winners do not use imported copra but obtain their supplies from local sources of copra of improved quality. Small-holders, however, shewed considerable interest and the class for *kampong*-produced coconut oil received over 200 entries; owing to the very high quality of many of the samples extra awards were made.

Products obtained from coconut husk and coconut shell, which included coir fibre, coir wool, twine, rope, sacks, matting, brushes, brooms, coconut charcoal, culinary utensils and fancy articles made from shell, featured prominently in the competitive classes.

Latex-coir paving blocks, flooring composition, imitation leather, bitumen-coir lagging material and imitation horse-hair produced from coir were also displayed and an attractive new product—coconut flour—prepared by a process recently developed in Ceylon.

The substitution of imported oils and fats; in particular groundnut oil, gingelly oil, lard and possibly also magarine, by oils and fats consisting wholly or principally of coconut oil, is an important problem which is receiving the attention of the Department of Agriculture. In this connexion, special classes were included to ascertain what products of such a nature are already available, but the response was disappointing, only one sample offering commercial possibilities as a substitute for groundnut oil. On one stand in the trade section, however, samples of cooking oil, specially flavoured and consisting wholly of coconut oil, were being distributed free.

It would appear that the production of deodorized coconut oil is an essential preliminary to the preparation of substitute oils and fats, but the class for refined coconut oil was poorly supported, although the winning sample—produced on an experimental scale—was of remarkable quality and demonstrated what can be done.

The classes for cosmetic preparations and medicated compounds having a basis of coconut oil obtained many entries. The prize-winning samples of hair oil were of attractive appearance and were suitably perfumed to mask the odour of the oil, but here again developments await the appearance of deodorized coconut oil when more delicate perfumes may be employed. In addition to samples of medicated preparations sent in for competition, two samples of embrocation containing a high percentage of coconut oil were exhibited complete with formulae, through the courtesy of the Government Pharmacist, Kuala Lumpur.

The production of copra is the basis of the coconut industry in Malaya and consequently particular attention was drawn to improving methods of production. A section of a kiln incorporating all the latest approved devices for ensuring uniform drying and the production of high-grade copra was a prominent feature of the section, while on one stall were models of kilns and display cases demonstrating faults in production methods. Special attention was drawn to the possibility of marketing a branded grade of Malayan copra, as many estates and numerous small-holders are now able to produce copra of a quality

superior to the blended product known as Straits f.m.s. copra which is exported from this country. Samples of domestic, imported and exported copra offered striking evidence of this fact, while in the competitive classes the quality of the copra reached a very high standard.

Estate copra was accompanied by a certificate that the sample submitted was prepared under commercial conditions of production; of twenty-two samples only one was not superior to the recognised Straits f.m.s. export grade, and eleven reached a very high standard indeed.

Four interesting speeches on various aspects of the coconut industry were delivered on the opening day. Mr. F. C. Cooke spoke briefly on "Improved Copra Kilns" and he was followed by the Hon'ble Mr. Tay Lian Teck who gave an informative address entitled "The Growing Industrialization of the Coconut Industry in Malaya", and Mr. G. H. Corbett who spoke on "Coconut and Copra Insects". In the main Lecture Hall, Mr. W. A. Stanton addressed an interested audience on "The Present Position and Organization of the Coconut Industry in Malaya."

Competitive Sections.

Most important in this group were the special All-Malayan Padi and All-Malayan Small-holders' Rubber Competitions. The former competition formed part of the Agricultural Section, but in view of its importance it will be dealt with separately.

All-Malayan Padi Competition.

The All-Malayan Padi Competition was inaugurated in 1934, and a full report of last year's competition, and also an article on the reasons leading up to its formation have already appeared in this Journal.*

The competition is divided into two parts: the local or district competitions, and the Central Competition at the Annual Malayan Exhibition of the Malayan Agri-Horticultural Association in Kuala Lumpur. Exhibits, consisting of three gantangs (Imperial gallons) of padi, must bear a statement giving the locality of the holding and size of the area from which the padi was drawn, together with a certificate of yield. At the conclusion of local competitions, prize-winning exhibits, in the ratio of three for every 10,000 acres of cultivated wet padi land, are forwarded to the Central Competition at Kuala Lumpur.

This year's competition was more representative, and included samples of padi from all States and Settlements with the exception of Kelantan, Trengganu and Perlis. The general response to the competition was again extremely satisfactory and the large number of local competitions necessary provided evidence of the interest aroused in the various districts.

In Perak, commencing in April, there were thirteen District Shows, culminating in a State Show at Taiping on the 25th July. Much of the padi at these shows gave evidence of under-ripening, a reflection of shortage of labour during harvesting.

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* *Malayan Agricultural Journal*, Vol. XXI, No. 12, December 1933, and Vol. XXII, No. 6, June 1934.

Considerable interest was again taken in the competition in Negri Sembilan, and thirty-nine mukim shows were held as a preliminary to four District Shows at which the final exhibits for the Central Competition were selected. A report of these shows indicates a marked improvement in the standard of exhibits and that the majority of exhibitors showed, by the general improvement in the standard, that they had grasped what was required and that it would be useless sending in mixed and poor samples.

The total number of exhibits in all local competitions was estimated to be 5,000, and 126 prize-winning samples of padi were entered in the Central Competition, selected as follows:—Perak 39, Selangor 15, Negri Sembilan 12, Pahang 19, Province Wellesley and Penang 9, Malacca 12, Kedah 17, Johore 3.

Preliminary selection reduced possible finalists to 32, and the standard of these exhibits was so high that the judges were faced with an extremely difficult task in making the awards.

Judging was carried out on the same basis as last year, 100 marks being allotted as follows:

1. Purity of sample	...	30
2. Type of grain	...	20
3. Condition and uniformity of ripeness	...	20
4. Condition and uniformity of grains	...	10
5. Weight per volume	...	10
6. Cleanliness	...	10
		100

The excellence of the winning samples can be gauged by the fact that the first nine exhibits gained between 95 and 98 marks, several others gaining 94 marks.

The first prize was awarded to an exhibit of Siam No. 29 padi from Malacca; this is a strain particularly advocated by the Department of Agriculture. The second prize was awarded to a sample of Nachin Puteh from Sabak Bernam, Selangor. Both these exhibits gained 98 marks, but the Siam No. 29 was finally decided to be slightly the better padi. The third prize went to Pahang for a good sample of a selected pure strain of Radin. Out of the nine exhibits submitted by Province Wellesley and Penang, six were included in the final 32, two of them receiving fourth and fifth prizes; the sixth prize went to Negri Sembilan. These four samples each gained 97 marks.

Kedah, though not successful in winning a prize, had eight exhibits in the final 32, out of a total of 17.

All-Malayan Small-holders' Rubber Competition.

In furtherance of the policy of fostering local industries, the Malayan Agri-Horticultural Association was requested by Government to organize a

special competition for small-holders' rubber on similar lines to the All-Malayan Padi Competition.

Rules were drawn up by officers of the Department of Agriculture with the assistance of the Director of the Rubber Research Institute, and the competition was inaugurated in the present year.

Several local competitions were held and a total of 57 exhibits was received for the Central Competition from the following competing States and Settlements: Selangor 20, Negri Sembilan 12, Pahang 3, Province Wellesley 6, Malacca 1, Johore 12, Perlis 3. Trengganu took part in the competition but the judges at the district show did not consider the exhibits of a high enough standard to warrant entry in the Central Competition.

Judging was carried out on a basis of 10 points as follows:—

	Air-dried Sheet	Smoked Sheet
Shade of colour or/ ...	1	
Freedom from over-smoking ...		1
Evenness of colour ...	1	1
Thickness ...	1	1
Freedom from:		
Mould and oxidation marks ...	2	2
Rust, bubbles and shortness ...	2	2
Specks and sand ...	3	3
	10	10

In the smoked sheet class, the first two prizes went to Negri Sembilan; the third prize was won by a competitor from Johore, and an entry from Pahang was very highly commended.

The first prize for air-dried sheet was won by a woman competitor from Malacca, and it is worthy of note that this was the only entry received for the Central Competition from that Settlement. The second prize went to Negri Sembilan, and the third prize to Johore.

On the whole, the standard of the smoked sheet exhibits was very high, but the same cannot be said of the air-dried sheet, although the prize-winning exhibits were very good indeed.

Judging of the smoked sheet, which comprised two-thirds of the total entry, was somewhat difficult owing to the high standard attained; many of the exhibits were fully equal to average estate sheet and the prize winners were first-class.

The three prizes in each class were won by Malays, whose entries predominated, but some good specimens of smoked sheet were received from both Chinese and Indian small-holders. It is of interest that women exhibitors won one first and two second prizes, and thus did better than the men, although their entries were fewer.

It is evident, from the results of this competition, that good quality sheet rubber can be prepared with primitive equipment on small holdings, and competition of this kind should do a great deal to raise the standard of smallholders' rubber.

Agricultural Section.

The arrangement of the agricultural section was similar to that of last year with the improvement of added bench space. Classes were re-grouped more conveniently, both for arrangement and judging, and the general lay-out was considerably improved.

The total number of entries received was 5,155, the big increase in comparison with last year being principally in the fruits and vegetables groups.

The section was divided into the following groups: 1, All-Malayan Padi Competition; 2, cereals; 3, food crops and products; 4, spices; 5, beverages; 6, tobacco, arecanuts and gambier; 7, fibres; 8, sugars and canned goods; 9, oils and fats; 10, fruits; 11, vegetables; 12, special classes.

The outstanding exhibit in the section was the display of fruits and vegetables by the Cameron Highlands Society. All of the produce included in this exhibit was of exceptionally fine quality, the cabbages being the most notable.

The number of exhibits in the fruits group far exceeded expectations and the general standard of quality was good. Papayas and durians were two of the best classes, both in numbers and quality; the average quality of the rambutans exhibited was good, but it was disappointing not to find any fruits of the best Penang marcotted strains.

The quality of the general vegetable classes was superior to that of last year, but the greater number of "collection of vegetables" were not up to last year's excellent standard. The School of Agriculture put up a well-arranged display of local vegetables of excellent quality grown by the students.

Exhibits of arecanuts were fewer than in 1934, but were considerably improved in quality. There was also a noticeable improvement in the quality of the tobacco exhibits, particularly in those of cured leaf.

In the group for "food crops and products" there were large numbers of exhibits of "gaplek" and "kripek", forms of sliced and dried tapioca root. Arrowroot flour, sago flour and tapioca flour were also well represented in this group.

The continued growth and expansion of this section together with the careful annual revision of the schedule, so that the competitive classes serve a definitely practical purpose, have made it one of the most interesting and instructive features of the Exhibition, and congratulations are due to those officers of the Department of Agriculture who have been primarily responsible for this development.

Village Industries.

A large building housed the Village Industries and Schools competitive sections and the separate State and schools stalls.

The competitive section of village industries was organized on the well-tried lines of previous years, and exhibits, from all parts of Malaya, reached a particularly high standard.

The schools section was again divided into two groups for Malay and English Schools, and this year was increased by the addition of certain classes from the needlework section. Individual schools also had their own stalls for the display and sale of exhibits made by their scholars.

State-organized stalls were again a feature of this section, and the gold medal for the most outstanding exhibit was awarded to the practical display of weaving given on the stall of His Highness the Sultan of Selangor. A further Selangor stall was organized by the Tunku Laksemana and had a representative display of locally made curios and other articles.

The Kelantan and Trengganu Arts and Crafts Societies again had attractively decorated stalls, and sales made were considerable. Port Dickson Malay women gave their usual display of bag-making.

Needlecraft, Preserves and Confectionery, Art and Photography.

These three sections were housed together in a separate building, which enabled exhibits to be displayed more satisfactorily than in previous years. Even so, with increasing interest in these sections, accommodation was inadequate and pointed to the need for even more space next year.

Horticulture.

The display in this section was the most successful that has been seen for several years and the capacity of the large building provided was tried to the utmost. The development of the classes for professional horticulturists should give the encouragement needed to make Malaya less dependent on foreign imports of fresh flowers, a point to which attention was drawn in the report of last year's Exhibition.

Poultry.

The poultry section was again considerably larger than in former years, and a large entry of small-holders' birds which arrived on the morning of the opening day rendered judging difficult and added to the section secretary's difficulties; he is therefore to be congratulated on the attractive lay-out and outstanding success of this section.

The Rhode Island Reds predominated and, together with the Light Sussex, were a feature of the section. The large number of pure-bred birds was extremely noticeable, but also there were several very fine cross-breds, in particular the Rhode Island Red x Indian game which won the first prize in the cross-bred class. Three Rhode Island Reds x Light Sussex birds were an interesting example of the success attained in cross-breeding in this country.

The classes for turkeys and pigeons also received more support than in previous years and the size of the section as a whole can be gauged by the fact that judging was not completed until the second day of the Show.

An exhibit of a bee-hive aroused considerable interest and was staged under the auspices of the Veterinary Department.

Pigs.

The pig section was well supported, the number of exhibits being slightly in excess of recent years. The quality of the exhibits shewed an improvement, although not a very marked one. As usual the Department of Agriculture displayed some pure-bred animals from the Central Experiment Station, Serdang; they were not for competition but formed a valuable standard by which to judge the other exhibits.

Pure bred animals were fewer in number than last year, but the good quality of the cross-bred exhibits was noticeable and also the improvement in the standard of the few Chinese sows entered.

Cattle.

The entries in this section were twice the number received last year when the section was re-introduced. Credit for this increase is due to the section secretary, who also undertook the organization of the poultry section.

The Department of Agriculture gave assistance by exhibiting pure-bred stock from the Central Experiment Station, Serdang.

The competitive exhibits were entered principally by local dairy farms, and, although their standard could not be considered high, they indicated that more interest is at last being taken in cattle breeding in Malaya.

Cats.

The cat section, held on the last day of the Exhibition, attracted a very large entry, and, as usual, pure bred Siamese cats predominated. The general standard of exhibits was very high.

Department of Agriculture, S.S. & F.M.S.

The exhibit this year was on a slightly smaller scale than those of former years, Departmental efforts being mainly concentrated on the special coconut section, which was housed in a separate building.

One of the most important sections of the Department's exhibit was concerned with the pineapple canning industry. Modern approved methods of planting, with special reference to the important question of the prevention of soil erosion, were clearly demonstrated by small models of correctly and incorrectly planted areas.

Types of pineapples suitable and unsuitable for canning were exhibited, with illustrations shewing the methods employed in establishing, by selection,

strains suitable for propagation and planting, particularly on plantations with pineapples as a sole crop.

Different grades of pineapples were also on view, both in tins packed locally and in glass jars, to demonstrate the standards required for the best grades.

Plans shewing the lay-out of a modern canning factory were exhibited, and a selection of canned fruits shewed what has been achieved during recent years in English factories in the canning of various fruits.

Another important exhibit explained the method of separation of the solid and liquid components of palm oil into palm oleine, the liquid fraction suitable as an edible oil, and palm stearine, the solid fraction, which is a suitable substance for soap-making and as a source of fatty acid for candles.

Two stalls were occupied by exhibits of rice and padi respectively. A limited number of selected strains of padi which can confidently be recommended as suitable for growing in different parts of the country were exhibited and aroused much interest amongst Malay visitors. The exhibit was designed not only to indicate the strains suitable for growing in large areas where conditions are uniform, but also the importance of growing uniform strains in such areas.

Samples of rice obtained by milling mixed padi were also shewn and compared with the better rice obtained by milling certain pure strains. A higher percentage of broken rice results when grains of uneven size are milled. The object of this exhibit was to indicate the advantages of growing pure strains in districts. Samples of rice milled from imported Rangoon and Siam strains were also shewn.

A portion of the building was occupied by small poultry houses of improved types. One of these called the "Small-holder's Night Ark" was made from materials readily available in the villages and attracted much attention.

The Co-operative Societies Department staged, in a corner of the building, an exhibit of the apparatus used by the Union of Co-operative Egg-Collecting Societies for testing and grading eggs, and gave explanations and demonstrations of the methods of "candling" eggs for freshness.

The School of Agriculture exhibited daily a film illustrating the life of students at the School and demonstrated, in addition, the courses of instruction given at the School.

A stand from which Departmental publications in English, Malay and Chinese could be obtained was well patronized.

Rubber Research Institute.

The Rubber Research Institute were unable to stage a separate exhibit this year but undertook the organization of the Central Competition of the All-Malayan Small-holders' Rubber Competition. The sheet rubber entries were attractively displayed over lighted glass panels.

The Institute also demonstrated a new economical smoke-house suitable for use on a rubber small holding. This remarkable little structure, composed

mainly of sacking, wood, and *atap*, can be constructed by the small-holder himself at a cost of five or six dollars. It is capable of holding some sixty sheets of rubber and was in constant operation during the Exhibition.

A pamphlet describing the smoke-house and giving instructions for its construction, could be obtained from the publications stall of the Department of Agriculture.

Other Government Departments.

The Public Health Department again staged an interesting and comprehensive series of exhibits in its own building, which was visited by a constant stream of visitors.

The Posts and Telegraphs Department provided telephone and postal facilities, and, in addition, staged a number of working models illustrating the operation of the automatic telephone and similar instruments.

The Federated Malay States Railways constructed an attractively designed stall which formed an enquiry bureau.

Cinema.

As in past years, free cinema shows were given by the staff of the Rural Lecture Caravan of propaganda films of the Agricultural and Co-operative Societies Departments. Daylight shows were given in the morning and afternoon, and continuous shows each evening commencing at 7 p.m.

Trade Section.

The trade section of these annual exhibitions acts as a barometer of economic conditions in Malaya, and this year very definitely reflected the general improvement of the past few months.

The section occupied nearly twice the floor space of 1934, taking up the whole of the main building and requiring, in addition, a temporary building of considerable size.

Engineering exhibits, as usual, predominated, there being four rubber sheeting batteries displayed on separate stalls, in addition to numerous other exhibits intimately connected with agriculture.

General.

The Y.W.C.A. again supplied a much needed rest-room for women which was greatly appreciated.

Daily performances were given by a company of Balinese dancers, and other amusements included an inter-Malay football competition, a cycling carnival, badminton tournament and fireworks.

The Malayan Agri-Horticultural Association is extremely fortunate in obtaining annually the enthusiastic support of the large number of ladies and gentlemen who contribute so greatly to the success of the exhibitions, and to

all these voluntary helpers we offer our congratulations on the outstanding success which has attended their latest efforts. Congratulations are also due to the police authorities for the very excellent traffic control which was maintained throughout the Sow.

Acknowledgment.

Acknowledgment is made of the assistance given by section secretaries in forwarding reports of their various sections of which considerable use has been made in the compilation of this report.

AGRICULTURAL SHOWS IN SELANGOR.

Ulu Selangor Agricultural and Padi Show.

A successful Agricultural and Padi Show, opened by the Hon'ble the British Resident was held at Kuala Kubu Bharu on June 9th. Among the many notabilities present were the Tengku Laximana and his party. This is the first show to be held representative of the whole District of Ulu Selangor. Numerous entries were obtained in most classes, but the entries under the padi section were of poor quality. Some good small-holders' rubber sheet was displayed, six exhibits being selected for entry in the All-Malayan Small-Holders' Rubber Competition to be held in Kuala Lumpur. 200 exhibits were shown in the poultry section. An exhibit of soap entered by the Sharikat Kemayeian Aam was selected for favourable comment by the judges. A Departmental exhibit illustrating recommended types of poultry accommodation was staged and the Asiatic Rubber Instructors constructed a small-holder's smoke cabinet of the type approved by the Rubber Research Institute.

Other interesting exhibits were shown by the Co-operative, Medical, Public Health and Mines Departments and by Towkay Tan Chin Siong.

Kuala Selangor Padi Show.

The Kuala Selangor District Padi Show was held on 6th July 1935. There were 50 entries in this competition which was opened by the Hon'ble Raja Uda, District Officer, Kuala Selangor. Some very fair samples of Siam and "Ranggong" type were shown, but the majority of exhibits were badly mixed; some were imperfectly winnowed and one was weevilly. The Department of Agriculture showed a series of specimens of the type required for the All-Malayan Padi Competition and a corresponding series illustrating common defects.

Kuala Langat Agricultural and Padi Show.

The Kuala Langat Agricultural and Padi Show was held at Telok Datok on the 14th July, 1935, and was opened by H.H. the Sultan of Selangor. With the exception of copra, the quality of the exhibits was good, the largest entries being obtained under the sections for rubber, copra, poultry and village industries. Departmental exhibits included model copra kilns of the types recommended for small-holders, samples of good and inferior copra and model poultry houses. The Asiatic Rubber Instructors erected a small-holder's smoke cabinet of the same type as that shown at Kuala Kubu Bharu.

Sabak Agricultural and Padi Show.

The Sabak Agricultural and Padi Show, held at Sabak on 14th July 1935 was opened by the Hon'ble the British Resident. A very satisfactory number of entries was received totalling about 2,000.

A good showing was made in the padi section, there being 200 exhibitors under this head. Village industries were also well represented. The exhibits of the Agricultural Department were confined to padi and were designed to indicate the type of sample required for the purposes of the All-Malayan Padi Competition, while a second series of samples indicated common defects of padi. Specimens of stem-borers and of the damage inflicted by them were also shown.

Ulu Langat Agricultural and Padi Show.

The Ulu Langat Agricultural and Padi Show, held at Kajang on July 1935, was opened by the Hon'ble the British Resident. It was generally considered that a marked improvement in standard was apparent as compared with previous shows in this District, the greatest progress having been made in the standard of the exhibits of poultry and fruit. The collection of abnormalities and freaks which has hitherto disfigured the poultry exhibit was noticeably absent and many good birds were shown. The padi section was, however, poor and entries for the All-Malayan Small-holders' Rubber Competition somewhat disappointing.

A number of three-quarter bred Light Sussex × *kampong* fowls, bred on the Cheras Agricultural Station, were displayed by the Department of Agriculture, together with padi and rat destruction exhibits, while the Asiatic Rubber Instructors exhibited a small-holder's smoke cabinet.

Reviews & Abstracts.

The Foreign Trade of Malaya 1934.

J. I. Miller, Government Printing Office, Singapore: 103 pp. Price $1 or 2s. 4d.

The author has presented a concise report of the foreign trade of Malaya in 1934, covering eleven pages, supported by thirty-seven tables.

In the year under review the foreign trade of Malaya amounted to $1,039,926,000, or £121,325,000, as compared with $767,104,000 or £89,495,000 in 1933, an increase of 35 per cent. The values of imports and exports in 1934 were $471,434,000 and $568,492,000 respectively, a favourable balance of $97,058,000 as compared with $42,158,000 in 1933. The increase in the total trade values was chiefly due to the rise in prices of rubber and tin, the total export values of which increased by $517 millions and $8 millions respectively.

A comparison of value of exports: merchandise, bullion, specie, shewed that 18.9 per cent. were to the United Kingdom, 11.8 per cent. to other countries in the British Empire, and 69.3 per cent. to non-British countries.

Malaya's best customers, in total values (millions of dollars) were the United States of America $197, the Netherlands Indies $196, the United Kingdom $175, Japan $89, Siam $80, France $33, India $29, Australia $28, China $28, Sarawak $24, Italy $20, Burma $19.

The features of the year were the laws passed regarding the regulation of rubber, textiles and canned pineapples. Tin control remained in force. The Trade Commission appointed to investigate the trade of the Colony published its report in June.

The principal feature of the trade of the year was its recovery and increase from $767 to $1,039 millions, thus exceeding the trade of 1931 and approximating to that before the world trade depression. This recovery is ascribed to restored general confidence and the effects of the regulation of rubber. The increase of imports from $362 to $471 millions (30 per cent.) represents a notable improvement in purchasing power.

D. H. G.

REVIEW OF THE SUGAR INDUSTRY 1933-34*.

Introduction.

The year 1933-34 marked another period of depression in the history of the sugar production of the world. Though in the previous year production was 157,000 metric tons less than consumption, it exceeded consumption by 740,000 metric tons in 1933-34.

* Abstract of "Review of the Sugar Industry of India during the Official Year 1933-34" by R. C. Srivastava and published as a Supplement to the *Indian Trade Journal*, August 15th, 1935.

The world sugar industry was also affected by several developments such as the inflationary policy of the United States of America, the attempts to make marketing agreements whereby sugar deliveries from the United States could be better adjusted to the requirements of the consuming countries, and the overthrow of the Machado Government in Cuba. The sugar industry in Cuba has passed through a critical period and the fluctuation between the high and low prices of the year was as much as 100 points.

The condition of the industry in Java was even worse, it being necessary to reduce price limits repeatedly in order to attract buyers. At the beginning of April 1933 the first cost quotation for Java White Sugar was 6 guilders per 100 kilos. The price steadily declined and stood at 4.10 guilders at the end of March 1934.

Sugar Trade of India.

The demand for imported sugar in India has undergone a remarkable change since the grant of protection to the sugar industry in India, as the Indian industry has developed its production steadily. Previous to 1932-33 there were only 31 cane factories in operation—the number in 1933-34 was 123. The area under the crop in India was 3,419,000 acres in 1933-34 as compared with 3,435,000 acres in 1932-33. Although the area decreased slightly during 1933-34, the production of cane increased by 3,343,000 tons due to the increasing adoption of improved varieties.

The severe earthquake which occurred on 15th January 1934 caused very extensive damage to the sugar industry in Bihar.

The total yield of raw sugar in India in 1933-34 was estimated at 5,067,000 tons, which exceeds the previous year's record yield of 4,684,000 tons by 8 per cent. The actual production of sugar in 1933-34 (excluding raw sugar) was 715,000 tons. It is estimated that production in 1934-35 will be 770,000 tons, and in 1935-36 835,000 tons.

The highest recovery for the season was 10.98 per cent. as compared with 11.10 per cent., during the preceding season. The average extraction for the whole of India shews a slight increase, *i.e.* 8.80 per cent. for 1933-34 as against 8.66 per cent. for 1932-33.

Imports of sugar amounted to 261,300 tons as compared with 369,500 tons in the previous year, the decrease being due to increased local production. The quantity of Java sugar imported was 194,400 tons as compared with 294,800 tons during the previous year. Beet sugar imports decreased to 27,556 tons as against 40,690 tons during the previous year.

The recent expansion of the sugar industry has brought work on cane at the Imperial Institute of Agricultural Research, Pusa, and elsewhere, into greater prominence. Investigations have been continued in various directions, including the production of early and late canes to extend the crushing season,

suitability of canes for various areas, the breeding of improved varieties, both from the point of view of high sugar content and resistance to disease, and on machinery.

Sugar Trade of Java.

The production of sugar in Java in 1933 amounted to 1,401,327 metric tons, as compared with 2,610,500 metric tons in 1932 and 2,843,652 metric tons in 1931. Java has suffered a tremendous shrinkage in her Far Eastern outlets partly on account of severe competition from other suppliers and partly by reason of the increase in the production of British India.

Exports of sugar amounted to 1,106,904 tons in 1933-34, as compared with 1,331,473 tons in 1932-33 and 1,543,153 tons in 1931-32.

The stocks on 1st April 1934 were estimated at 2,519,619 tons, as compared with 2,532,639 tons a year previously.

The year 1933 witnessed a drastic reduction in the Java industry. Only 99 factories were active as compared with 166 in the preceding year. The area planted was 208,947 acres, compared with 423,924 acres in 1932, and the total amount of cane harvested was 11,086,662 tons against 22,587,839 tons in 1932. The average yield of cane amounted to 52.21 tons per acre. The sugar content of the cane was much better than that of the previous season, the average sugar extraction attained being 12.64 per cent. as against 11.16 per cent. in 1932.

Sugar Trade of Cuba.

The sugar trade of Cuba in 1933 was influenced by several developments such as the inflationary policy of the United States Government with its accompanying withdrawal from the gold standard; the attempt at the formation of a sugar stabilization plan including crop restriction and marketing agreements amongst the domestic sugar producers; the possibility of some reduction in Cuban duty; and finally, the overthrow of the Machado Government of Cuba.

Under inflation and the effects of the proposed marketing agreements, prices rose to the highest point of the year, *viz.*, 1.65 cents per lb. for raws on 12th July 1933. The scheme was, however, finally abandoned as it was found impossible to devise a satisfactory method of allotting sugar crop.

The production of sugar in 1933 amounted to 1,995,000 tons as compared with 2,603,000 tons in 1932 and 3,122,000 tons in 1931.

World Sugar Position in the year 1933-34.

The world sugar production in 1933-34 was estimated to be 26,719,000 metric tons as compared with 25,719,000 metric tons in the previous year. Beet sugar production was 8,962,000 metric tons as compared with 7,896,000 metric tons in 1932-33, while cane sugar production was 17,983,000 metric tons as compared with 17,823,000 metric tons. American cane sugar production increased while Asian production decreased.

World consumption in 1933-34 was 26,205,000 metric tons as compared with 25,876,000 metric tons in the previous year.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

August, 1935.

The Weather.

The dry weather which had prevailed in most parts of the Peninsula throughout July came to an end between the 11th and 15th of August. Heavy rains were experienced which brought the total rainfall for the month up to or above average nearly everywhere. Exceptions were Johore Central and Pahang South and East Circles where the rains were light. The rains in the north were only just in time to relieve a situation which was rapidly becoming critical and which had given rise to great anxiety.

Remarks on Crops.

Padi.—The price of padi remained unchanged.

In Krian and Perak North generally, nurseries and early transplanted fields have shewn good recovery from the effects of the drought; in Selama however, early-sown nurseries failed completely and will have to be resown. Rat damage in Krian has been slight in spite of highly favourable conditions for this pest, convincing testimony to the success of campaigns in previous seasons. During the month 3,600 rats were killed. In Perak South padi planting was in progress or completed in Kinta, Bidor, and Tanjong Malim Districts. Planting was rather late in the up-river *mukims* with the result that some loss was caused by heavy rains. Some of the dry nurseries in the Sungei Manik area were flooded out and have been replaced by fresh nurseries. In this area there is at present ample water supply which permits of clearing which, however, is progressing slowly; of 4,400 acres alienated only 2,600 can be considered yet fit for planting. Water hyacinth was observed in the lower reaches of the Bidor River. In Perak North it was remarked that as a result of the local and State padi shows there has been a sudden demand for pure strain seed, illustraing the great utility of local shows.

Severe drought in the Tanjong Karang area at Kuala Selangor resulted in the loss of the greater part of the nurseries. Good progress was made in the Panchang Bedena area with stumping. Transplanting was late in Kuang.

Transplanting was completed in the Seremban and Port Dickson Districts. Fairly considerable damage from flooding occurred in the Siliau-Rembau areas which will necessitate some replanting. In the Tampin, Rembau and Kuala Pilah areas transplanting is in progress. There is some shortage of seedlings

in the Selama and Rembau areas as many of the nurseries which were of a dry type suffered severely from drought in July. It is hoped to meet this situation by the distribution of short maturation varieties of padi such as Radin Siak, from the Kendong Padi Test Plot.

In Province Wellesley and Penang following rain, work of clearing and planting is in full swing. About 5,000 acres have been planted in the Northern Division and sowing for dry padi has been completed. In Province Wellesley Central planting has been completed in Ara Kuda. There was some flooding but no serious damage. In Province Wellesley South preparation of nurseries commenced early and in many areas sowing has been completed. In Penang Island the work of cutting down the weeds is in progress and in several areas nurseries have been completed. A total of 31 rat hunts was held and the organization of further hunts is receiving attention.

In Pahang North transplanting has been practically completed in the riverine areas and growth is satisfactory. Many nurseries in the road *mukims* of Lipis have suffered from lack of water and will have to be resown. In Pahang South planting in the Temerloh and Bentong areas is in full swing. Owing to lack of water the area planted is somewhat less than it was last year and the condition of the padi is not very satisfactory.

Wild pigs have given trouble to padi cultivators at Temerloh. A regular programme of pig hunts has been arranged and several *panjara* areas have been demarcated *i.e.* areas have been planted with trap crops such as tapioca and strongly fenced with one-way doors in the fencing. In Pahang East conditions are much the same as they were in 1934. No padi at all has been planted in Pontian *mukim* due to a flourishing fishing season. There has been some retardation of operations in the Sungei Blat area and crops have been severely affected by drought in the *mukims* of Ulu Lepar and Kuala Kuantan.

In Malacca there was sharp flooding about the middle of the month and some replanting will be necessary at Bukit Bahru and Bukit Piatu *mukims* of the Central, and in part of the Alor Gajah Districts. Transplanting was completed or well in hand in the Central and Alor Gajah Districts, but the coastal *mukims* were behindhand in comparison with the scheduled dates. There was some damage to padi by army worms (*Podoptera* sp.); in many cases the problem was solved by the washing away of the pest by heavy rains.

In Johore South in the west coastal areas the crop suffered from lack of water, and growth and development is poor. In Johore Central padi is in flower in the Kota Bahru, Lubok and Senggarang areas. Growth is fair at Kluang; transplanting is proceeding at Endau. In Johore North and in the Segamat District padi suffered from drought and in some areas the situation is becoming critical. Harvesting of dry padi commenced at Parit Jimah and low yields of 125 to 150 gantangs were obtained, the natural result of the continuous planting of the same land.

In Kelantan, planting of dry padi was not completed until the middle of the month. This is likely to render effective weeding difficult.

Rubber.—Prices in general remained steady except in Pahang where there was a decline of 50 cents to $1 per picul. There was slight secondary wintering in the early part of the month in Perak South and Johore Central. The onset of rain caused the appearance of a certain number of cases of Mouldy Rot. Nowhere however was this serious and it would appear that routine measures of treatment are now generally understood and followed.

Considerable interest in smoke cabinets has been recorded in Perak South, Malacca, Kelantan and Province Wellesley. On the other hand, enthusiasm for these cabinets has waned considerably in Johore North possibly due to the very small margin between the price of smoked and unsmoked sheet in this Circle. The smoke cabinet at Bidor is not yet turning out good sheet.

The general upward trend in the conditions of small holdings continues.

Coconuts.—Prices for coconuts and copra have remained practically unchanged. Copra manufacture on improved kilns in Krian and Province Wellesley Districts continues to be satisfactory and good prices are obtained on the Penang market. Little copra is being made in the Perak Central Circle where the demand is rather for whole nuts for eating. The preparation of coconut oil is being encouraged in villages. In the Bagan Datoh district, manufacture on improved kilns continues and special attention is being paid to crude kilns.

In Selangor the attack of Artona in the Sepang district is rapidly abating. A new improved kiln was erected in the Kuala Selangor District with a capacity of 3,000 nuts. A tendency to revert to the preparation of lower grade copra has been noted in this District.

In Pahang North the planting of new areas is proceeding satisfactorily. In Pahang East another improved kiln has been erected at Tanjong Medang. Five new kilns are now working in this Circle and the product is being disposed of satisfactorily in Singapore.

The attack of Artona at Kuala Bebar is gradully decreasing.

Several new kilns have been erected in the Benut and Senggarang areas of the Batu Pahat District of Johore Central. Small-holders in this District are awakening to the advantage of closer supervision of their selling, and many are now themselves weighing copra before despatch in order to have a check on buyers. Copra producers in the Parit Bakang and Senggarang areas are receiving 5 to 10 cents per picul premium over ruling local prices on account of low moisture content of their output.

Fruit.—The fruit season is generally over and in many areas prices have risen in consequence. In Pahang East both Malays and Chinese are evincing considerable interest in marcotting of fruit trees. Seventy-five acres have been opened in the *mukim* of Penor mostly for fruit cultivation.

Agricultural Stations and Test Plots.

Routine work, with some delay in the case of padi due to dry weather, has been carried out in all Stations. At the Sungei Manik Station over a mile of bund has been opened; both stumping and filling is almost complete. The clearing of the second block proved difficult in the latter part of the month owing to excess of water on the land. The establishment of the Ampang Tinggi Padi Test Plot made good progess; particularly heavy weed growth had to be dealt with in this block as it has been uncultivated for several years.

Considerable damage was done to fruit trees, coffee bushes and Gliricidia at the Bukit Mertajam Agricultural Station by leaf-eating beetles, and the damage continued in spite of regulation application of lead arsenate. It is certain that beetles are breeding in the cover crop and it is proposed partially to clear the areas as a measure of control. A good crop of mushrooms was obtained at the Bukit Merah Station and the preparatory work of clearing, filling and digging is well in hand at the Ayer Hitam Station of Penang Island.

The deepening of the main outlet at Kelantan Agricultural Station should improve drainage; the permanent crops there have withstood the drought well. Trouble has been experienced at the Pekan Agricultural Station by *lalang* grass invasion from the borders.

Miscellaneous.

There was a serious outbreak of poultry disease at Lumut and Kuantan. Distribution of Rhode Island Red chicks made in Kelantan to selected *penggawa* (Malay officers in charge of an area) was followed up and in all cases the poultry were found to be making good progress.

In Johore Central an interesting experiment in poultry production by a Chinese partnership is under observation. Day-old chicks are purchased in fairly large batches (up to 150); advice was given which reduced the mortality experienced on the early consignments, and the survival rate is now satisfactory.

The area under derris in Johore Central continues to expand and buyers at present are canvassing for supplies.

DEPARTMENTAL NOTES.

Visits of the Adviser on Agriculture.

The Acting Director of Agriculture, S.S., and Adviser on Agriculture Malay States, visited Singapore on 14th and 15th August for the purpose of inspecting the Pineapple Station, and also of interviewing the Municipal Health Officer, Singapore, regarding regulations relating to the pineapple industry.

On 19th August he accompanied the Acting British Resident, Selangor, on a visit to the Central Experiment Station, Serdang.

He inspected the Experiment Station, Tanah Rata, Cameron Highlands, on 24th August.

Visit of Agent, Malayan Information Agency.

Mr. V. Lowinger, C.B.E., Agent, Malayan Information Agency, London, visited the Department of Agriculture, Kuala Lumpur, on 10th August for the purpose of discussing various matters of agricultural interest with the Adviser on Agriculture.

Penghulus' Course of Instruction.

Thirty-five penghulus from various parts of the Federated Malay States and Straits Settlements attended a course of agricultural instruction in August. The Course was in two parts; the first part at the Central Experiment Station, Serdang, and the School of Agriculture, and the second part divided between Kuala Lumpur, Klang and Malacca.

Part I of the Course, from 12th to 17th August, comprised practical and theoretical instruction. Instruction on the Plantation covered fruit, coffee, tobacco, nursery work, use of implements and a tour of the Plantation. At the School, the penghulus received instruction in poultry husbandry, including practical work and lantern lectures, nature study, marketing of village produce and village credit.

For Part II, from 19th to 22nd August, the penghulus were divided into three parties so that each penghulu received special instruction in one subject, selected as being of particular importance in the District in which he works. Those receiving instruction in copra manufacture proceeded to Klang where they received practical instruction, demonstrations and lectures on this subject, in addition to visiting an oil mill and several copra-drying kilns in the District.

Thirty-five penghulus including nine from Johore who did not attend Part I, attended a course of instruction on padi at the Pulau Gadong Experiment Station, Malacca, the subjects of lectures and demonstrations covering the whole process from preparation of the land and planting to milling, and including seed selection and control of pests.

* Penghulu = Malay headman.

Four penghulus attended the course of instruction on rubber. It included lectures on diseases of the rubber tree at the Rubber Research Institute of Malaya at Kuala Lumpur, lectures and demonstrations on rubber manufacture, and tapping systems together with a visit to the Rubber Research Institute Experiment Station, Sungei Buloh, where a tour was made of the Plantation, and a field lecture delivered on soil conservation.

The instruction was given by officers of the Department of Agriculture, except that officers of the Rubber Research Institute were responsible for the course on rubber, and an officer of the Co-operative Department for the lecture on village credit.

Leave.

Mr. H. T. Pagden, Senior Entomologist, British Solomon Islands Protectorate, reverted to the Malayan Service on 17th July 1935 as Research Entomologist for Rice, Department of Agriculture, F.M.S. Mr. Pagden arrived in Malaya and assumed duty on 15th August 1935.

Statistical.

MARKET PRICES.

August, 1935.

Rubber.—The price of rubber continued at a low level throughout August, with only slight fluctuations. Spot loose opened in Singapore at 19⅝ cents per lb. and closed at 19 3/16 cents, the price not rising to 20 cents throughout the month. The Singapore average price for No. 1. X Rubber Smoked Sheet was 19.40 cents per lb. as compared with 19.58 cents in July. The average price in London for the month was 5.72 pence per lb., and in New York 11.92 cents gold per lb. as compared with 5.84 pence and 12.04 cents gold in the previous month.

Prices paid for small-holders' rubber at three centres during the month are shewn in the following table.

Table I.
Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, August, 1935.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.					Kuala Kangsar, Perak.			Batu Pahat, Johore.				
						July	August		July	August			
	1	8	15	22	29	31	7	21	31	7	14	21	28
Smoked sheet	24.00		23.80		23.73	23.08	23.92						
Unsmoked sheet	22.97	22.50	22.50	20.96			22.00	22.00	22.04	22.00	21.50	21.00	21.37
Scrap													

Transport by F. M. S. R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent

No purchases at Kuala Kangsar on the 14th and 28th August.

Palm Oil.—Prices shewed a slight upward tendency towards the end of August as indicated in the following table.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
Aug. 2	17. 10. 0	7. 10. 0
„ 9	17. 10. 0	7. 10. 0
„ 16	18. 0. 0	7. 10. 0
„ 23	18. 5. 0	7. 12. 6
„ 30	18. 10. 0	7. 12. 6

Copra.—Prices in Singapore fell steadily during the month with a very slight improvement at the close. The sun-dried grade opened at $4 per picul and closed at $3.80, the average price for the month being $3.84 per picul as compared with $3.87 in July. The mixed quality averaged $3.43 per picul as against $3.47 in the previous month.

Copra cake continued unchanged at $1.50 per picul.

Rice.—The average wholesale prices of rice per picul in Singapore for July were as follows:—Siam No. 2 (ordinary) $4.22, Rangoon No. 1, $3.77, Saigon No. 1 $3.87, as compared with $4.34, $3.72, $3.87 in June. Corresponding prices in July 1934 were $2.78, $2.77 and $2.82.

The average retail market prices in cents per gantang of No. 2 Siam rice were:—Singapore 32, Penang 23, Malacca 29, as compared with 32, 23 and 30 respectively in June.

The average declared trade value of imports of rice in July was $3.76 per picul, as compared with $3.80 in June and $3.97 in May.

Padi.—The Government Rice Mill at Bagan Serai continued to pay $2 per picul for padi and two privately owned mills in the Krian District also paid the same price. Retail prices per gantang ranged from 5 cents to 13 cents in different parts of the country.

Tea.—Eight consignments of Malayan tea were sold on the London market during August, average prices obtained ranging from 9¾d. to 11d. per lb.

Average London prices per lb. during August for tea consignments from other countries were as follows:—Ceylon 1s. 1.06d., Java 9.61d., Indian Northern 1s. 0.78d., Indian Southern 10.91d., Sumatra 8.54d.

The latest Colombo average prices available quoted from the *Weekly Tea Market Report,* 27th August 1935 of the Colombo Brokers' Association are as follows:—(prices are in rupee cents per lb.) High Grown Teas 85 cents, Medium Grown Teas 70 cents, Low Grown Teas 58 cents.

Tuba Root (Derris).—Prices in Singapore weakened during August, roots sold on a basis of rotenone content averaging only $51 per picul as compared with $53 in July. Roots sold on a basis of ether extract fell to $37 per picul from $40 in the previous month. Non-Malayan roots continued unchanged at $32 per picul.

Coffee.—Prices in Singapore continued to fall during August. Sourabaya coffee fell from $14 to $13 per picul, and Palembang coffee averaged $6.60 per picul, as compared with $9.31 in July and $11.19 in June.

Local prices for coffee ranged from $14 to $30 per picul, depending upon quality.

Arecanuts.—Prices fell back slightly in Singapore during August with the exception of Sliced which shewed some improvement. Average prices per picul were:—Splits $4.75 to $6.50, Sliced $10.40 to $12.40, Red Whole $5 to $6.52, Kelantan $6.10 to $6.60, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best $7.65, Medium $6.90, Mixed $6.

Gambier.—After remaining unchanged throughout the month prices weakened slightly at the close. Block averaged $5.90 per picul, and No. 1 Cube averaged $10.30, as compared with $6 and $10.62 respectively in July.

Pineapples.—There was no change in the prices for canned fruit (per case) fixed by the Packers' Combine in Singapore. They were:—Cubes $3.45, Sliced Flat $3.25, Sliced Tall $3.60.

Fresh fruit prices per 100 were:—Johore 1st quality $3 to $4.50, 2nd quality $2 to $4, 3rd quality $1 to $3. In Selangor prices ranged from 70 cents to $1 per 100.

Tapioca. Prices have remained unchanged for several months; they are (per picul): Flake Fair $4, Seed Pearl $5.40, Medium Pearl $6.

Sago.—Pearl Small Fair, weakened slightly at the close of August to average $3.74 as compared with $3.75 in July. There was good demand for Flour, Sarawak Fair, but the average price advanced very slightly, the average for the month being $2.27½ per picul as against $2.26 in July.

Mace.—Siouw improved in price during August, averaging $82.20 per picul as compared with $76.25 in the previous month. Amboina averaged $56.60 per picul as against $58.25 in July.

Nutmegs.—Prices in Singapore fell during August, 110's averaging $27.60 per picul and 80's $29, as compared with July averages of $28 and $31 respectively.

Pepper.—Prices of white pepper advanced slightly, although there was little business done during the month. Singapore average prices per picul were :—Singapore Black $9.75, Singapore White $17.20, Muntok White $18.10 as compared with $10.25, $16.75 and $17.75 respectively in July.

Cloves.—Nominal quotations in Singapore for both Zanzibar and Amboina remained unchanged at $35 per picul.

Cardamoms.—According to the Ceylon Chamber of Commerce weekly reports, cardamoms, green, were quoted during August at 90 rupee cents to R.1.07 per lb. falling at the close to 85 rupee cents to R.1.05 per lb.

Tobacco.—In Perak prices per picul were: 1st quality $35 to $40, 2nd quality $20 to $26, 3rd quality $15 to $18. In Johore prices were higher, ranging from $30 to $60 per picul; in Negri Sembilan prices ranged from $10 to $50 per picul, and in Penang from $18 to $30.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY*

July, 1935.

Malaya.—Imports of foreign rice in July were 57,232 tons and exports 14,857 tons, net imports being 42,375 tons. Net imports for the period January to July 1935 totalled 263,697 tons as compared with 262,917 tons in 1934.†

Of the July imports, 49 per cent. were consigned to Singapore, 17 per cent. to Penang, 6 per cent. to Malacca, 23 per cent. to the Federated Malay States and 5 per cent. to the Unfederated Malay States. Of the total, 56 per cent. came from Siam, 39 per cent. from Burma, 4 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during July, 77 per cent. were consigned to the Netherlands Indies and 23 per cent. to other countries. The various kinds of rice exported were :—Siam 10,000 tons, (67.3 per cent.), Burma 3,718 tons (25 per cent.), French Indo-China 647 tons (4.4 per cent.), parboiled rice 390 tons (2.6 per cent.), local production 102 tons (0.7 per cent.).

India and Burma.—Foreign exports for the first half year were 1,134,000 tons, an increase of 24.3 per cent. as compared with 1934. Of the 1935 exports 4.8 per cent. were to the United Kingdom, 12.1 per cent. to the Continent, 19.9 per cent. to Ceylon, 32.5 per cent. to the Straits Settlements and the Far East, and 30.7 per cent. to other countries. The 1934 corresponding percentages were 10.9, 20.6, 21.5, 18.2 and 28.8.

Burma's total exports of rice and bran (*Bangkok Times,* 5th August, 1935) from 1st January to 29th June 1935, totalled 2,158, 806 metric tons, as compared with 2,349,799 metric tons in 1934, a decrease of 8.1 per cent.

Siam.—Exports of rice and rice products from Bangkok in June were 93,188 tons and in July, 101,416 tons; these figures are provisional. The total exports for the seven months totalled 896,098 tons as compared with 1,007,564 tons in 1934.

Japan.—Rice stocks in Japan on 1st July (*Trans-Pacific Journal,* 18th July, 1935) amounted to 3,801,046 tons, a decrease of 23.7 per cent. as compared with 1934.

The estimated supply and demand for the period 1st July to 31st October 1935 are :—

Supply :	Stock 1 July	...	3,801,000 tons
	Estimated imports	...	645,000 ,,
			4,446,000 ,,
Demand :	Estimated exports	...	21,000 ,,
	Estimated consumption	...	3,033,000 ,,
			3,054,000 ,,

shewing a surplus of 1,392,000 tons.

* Abridged from the Rice Summary for July 1935, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1934.

French Indo-China.—Entries of padi into Cholon during the first seven months of 1935 totalled 1,223,082 metric tons, an increase of 29.7 per cent. as compared with 1934. Exports of rice for the same period increased by 40.4 per cent. to 1,270,418 metric tons as compared with 905,004 metric tons in 1934.

The Netherlands Indies.—Imports of rice (*The Netherlands Indies,* 1st August, 1935) during the first five months of 1935 amounted to 220,000 metric tons, as compared with 72,800 metric tons in 1934, an increase of 202.2 per cent.

The total area under padi harvested in the Netherlands Indies during the same period was 5,530,330 acres as compared with 5,359,000 acres in 1934.

Ceylon.—Imports for the first seven months of 1935 totalled 299,485 tons, an increase of 7.8 per cent. as compared with 277,911 tons in 1934. Of these, 12.5 per cent. were from British India, 68.9 per cent. from Burma, 1.2 per cent. from the Straits Settlements and 17.4 per cent. from other countries. The corresponding 1934 percentages were: 13.7, 64.2, 0.2 and 21.9.

Europe and America.— Shipments to Europe from the East for the period 1st January to 18th July were 547,695 tons a decrease of 32.8 per cent. as compared with 814,459 tons in 1934.

Of the 1935 shipments 55.3 per cent. were from Burma, 4.3 per cent. from Japan, 33.0 per cent. from Saigon, 5.5 per cent. from Siam, and 1.9 per cent. from Bengal. The relative percentages in 1934 were: 40.5, 4.8, 43.2, 9, and 2.5.

Shipments for the Levant from the East for the period 1st January to 21st June were 22,194 tons as against 20,335 tons in 1934, an increase of 9.1 per cent.

Shipments for Cuba, West Indies and America from 1st January to 23rd June increased by 15.1 per cent. to 126,145 tons from 109,550 tons in 1934.

MALAYAN AGRICULTURAL EXPORTS, JULY, 1935.

PRODUCT.	Net Export in Tons.				
	Year 1934.	Jan-July 1934	Jan-July 1935	July 1934	July 1935
Arecanuts ...	27,336	19,594	14,644	2,344	2,277
Coconuts, fresh † ...	100,804†	58,227†	62,152†	12,532†	13,522†
Coconut oil ...	25,485	14,509	17,980	1,926	3,172
Copra ...	95,599	54,302	61,552	9,475	10,069
Gambier, all kinds ...	2,170	1,239	1,605	197	299
Oil cakes ...	11,273	7,108	4,423	917	830
Palm kernels ...	3,196	1,664	1,882	319	280
Palm oil ...	15,852	7,388	12,076	1,159	2,486
Pineapples canned ...	66,634	48,382	46,039	8,825	6,950
Rubber ¶ ...	479,371¶	238,619¶	230,917¶	31,079¶	37,972¶
Sago,—flour ...	10,403	3,988	5,319	258*	36*
„ —pearl ...	5,058	2,588	2,662	465	366
„ —raw ...	7,079*	3,544*	4,176*	645*	561*
Tapioca,—flake ...	5,761	4,434	1,136	320	155
„ —flour ...	1,842*	1,255*	614*	17*	116*
„ —pearl ...	15,770	9,382	9,785	1,441	1,866
Tuba root ...	481	348½	361	51½	48

† hundreds in number. * net imports. ¶ production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS

(As declared by Estates)

Period.	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January 1935 ...	1,062.3	339.3	174.0	49.6
February „ ...	977.4	220.9	161.7	38.5
March „ ...	1,104.3	334.2	172.6	48.6
April „ ...	1,008.2	328.0	151.2	40.4
May „ ...	1,077.1	461.8	158.6	63.1
June „ ...	1,311.0	724.1	200.9	105.5
July „ ...	1,901.2	729.0	255.3	109.0
Total ...	8,441.5	3,137.3	1,274.3	454.7
Total January to July 1934 ...	6,315.9	2,397.3	1,069.8	470.0
Total at end of 1934 ...	12,965.0	4,510.0	2,013.0	795.0

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST JULY, 1935.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1934	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (*a*)		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,691	294	.7	13,188	29.5	770	1.7	13,482	30.2
Malacca	123,793	902	.7	20,551	16.6	3,214	2.6	21,453	17.3
Penang Island	2,593	...	...	274	10.6	134	5.2	274	10.6
Singapore Island	33,312	4,175	12.5	7,186	21.6	570	1.7	11,361	34.1
Total S.S. ...	204,389	5,371	2.6	41,199	20.2	4,688	2.3	46,570	22.8
FEDERATED MALAY STATES :—									
Perak	295,895	6,719	2.3	47,155	15.9	12,912	4.4	53,874	18.2
Selangor	345,100	8,803	2.6	47,092	13.6	13,368	3.9	55,895	16.2
Negri Sembilan	258,381	10,428	4.0	38,984	15.1	15,732	6.1	49,412	19.1
Pahang	75,912	6,956	9.2	21,928	28.9	14,112	18.6	28,884	38.1
Total F.M.S. ...	975,288	32,906	3.4	155,159	15.9	56,124	5.8	188,065	19.3
UNFEDERATED MALAY STATES :—									
Johore	417,633	16,484	3.9	55,102	13.2	35,763	8.6	71,586	17.1
Kedah	199,180	3,880	1.9	22,423	11.3	19,349	9.7	26,303	13.2
Kelantan	28,891	403	1.4	8,615	29.8	5,673	19.6	9,018	31.2
Trengganu (*b*)	4,643	Nil	Nil	15	0.3	5	0.1	15	0.3
Perlis (*c*)	1,206	Nil	Nil	505	41.9	25	2.1	505	41.9
Brunei	(*d*) 4,991	Nil	Nil	1,590	31.9	877	17.6	1,590	31.9
Total U.M.S. ...	656,544	20,767	3.2	88,250	13.4	61,692	9.4	109,017	16.6
TOTAL MALAYA ...	1,836,221	59,044	3.2	284,608	15.5	122,504	6.7	343,652	18.7

Notes :—(*a*) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
(*b*) Registered Companies only.
(*c*) Rendered quarterly.
(*d*) Acreage of tappable rubber on 1st May, 1934.

MALAYA RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF JULY, 1935 IN DRY TONS.

State or Territory 1	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		Jan. to July inclusive 1935		during the month		Jan. to July inclusive 1935						
	Ports	Dealer	Estates of 100 acres and over	during the month	January to July inclusive 1935	during the month	January to July inclusive 1935	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	January to July inclusive 1935
MALAY STATES :—	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Federated Malay States ...	...	9,571	12,237	11,657	79,546	9,076	43,426	Nil	Nil	17	Nil	12,371	8,103	*99,467 †87,517	†28,679	...	10,547	11,510	10	65
Johore ...	...	2,037	4,372	4,644	28,611	3,899	24,138	Nil	13	Nil	118	2,817	5,784	17,400	33,318	...	2,307	4,057	...	...
Kedah ...	...	276	2,332	2,753	17,857	1,121	6,704	Nil	Nil	Nil	Nil	1,339	2,411	10,469	13,128	...	365	2,367	...	...
Perlis ...	...	9	25	11	80	21	110	Nil	Nil	Nil	Nil	Nil	27	Nil	190	...	15	24	...	...
Kelantan ...	...	193	321	358	2,244	549	3,176	Nil	Nil	Nil	Nil	282	521	1,164	3,972	...	328	290	...	...
Trengganu ...	...	55	50	346	1,798	173	899	Nil	Nil	Nil	Nil	Nil	519	Nil	2,697	...	55	50	...	...
Brunei	...	5	35	52	337	58	408	...	...	...	...	...	110	...	731	...	5	35	...	...
Total Malay States	...	12,146	19,372	19,821	130,473	14,897	78,861	Nil	13	17	118	16,809	17,475	128,500	82,715	...	13,622	18,333	10	65
S. SETTLEMENTS :-																				
Malacca ...	...	2,405	1,438	1,175	9,048	699	4,526	Nil		Nil		2,144		18,957		...	2,724	1,269	...	...
Province Wellesley	...	1,951	563	492	3,422	274	1,568	Nil		Nil		5,601		48,776		...	2,407	455	...	...
Penang ...	2,245	8,547	12	19	115	158	659	1,563	14,259	15,863	80,495		Nil		Nil	4,784	9,437	15	...	...
Singapore ...	5,659	35,319	292	192	1,323	232	829	9,606		99,362		24,421		161,723		3,908	31,829	255	41	282
Labuan	...	30	Nil	Nil	Nil	13	93	88		656		Nil		Nil		...	60	Nil	...	...
Total Straits Settlements	7,904	48,252	2,305	1,878	13,908	1,376	7,675	11,257	14,259	115,881	80,495	32,166	Nil	229,456	Nil	8,692	46,457	1,994	41	282
TOTAL MALAYA	7,904	60,398	21,677	21,699	144,381	16,273	86,536	11,257	14,272	115,898	80,613	48,975	17,475	357,956	82,715	8,692	60,079	20,327	51	347

* Ocean shipments from Malaya of rubber directly consigned from the F.M.S. † Exports of rubber from the F.M.S.

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber 22	Federated Malay States 23	S'pore 24	Penang 25	Province We'sly D'dings M'cca. 26	Johore 27	Kedah 28
DRY RUBBER	9,439	29,035	8,364	4,963	1,712	194
WET RUBBER	1,108	2,794	1,073	233	595	171
TOTAL ...	10,547	31,829	9,437	5,196	2,307	365

TABLE III
FOREIGN EXPORTS

PORTS 29	For month 30	January to July 1935 31
Singapore ...	33,947	239,735
Penang ...	8,924	77,502
Port Swettenham.	5,767	38,258
Malacca ...	337	2,461
MALAYA ...	48,975	357,956

TABLE IV
DOMESTIC EXPORTS 4

AREA 32	For month 33	January to July 1935 34
Malay States ...	34,284	199,028
Straits Settlements	3,423	20,243
MALAYA ...	37,707	219,271

Notes :—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Column (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 24 August, 1935.

METEOROLOGICAL SUMMARY, MALAYA, JULY, 1935.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B.	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	88.3	72.1	80.2	92	70	81	74	83.7	84.7	3.28	83.3	0.94	7	6	1			148.55	4.79	39
Bukit Jeram, Selangor ...	88.1	73.1	80.6	91	71	81	75	83.9	85.9	0.93	23.6	0.39	10	8	1			193.40	6.24	51
Sitiawan, Perak ...	90.1	72.9	81.5	93	70	85	75	84.7	85.0	1.14	29.0	0.75	4	3	1			201.25	6.49	53
Temerloh, Pahang ...	89.2	72.0	80.6	94	70	79	73	84.9	86.1	3.21	81.5	2.24	9	4	1	7		193.05	6.23	51
Kuala Lipis, Pahang ...	88.6	72.0	80.3	91	70	84	74	84.0	84.8	1.68	42.7	1.07	5	3	1	29		182.50	5.89	48
Kuala Pahang, Pahang ...	86.3	74.9	80.6	91	73	83	79	85.4	85.9	3.09	78.5	1.33	11	8			1	196.90	6.35	52
Kallang Aerodrome, S'pore ...	86.3	78.5	82.4	88	72	81	81	82.0	82.9	3.09	78.5	1.34	12	8	1			215.30	6.95	57
Butterworth, Province Wellesley ...	88.0	74.6	81.3	90	71	84	77	85.0	85.7	2.64	67.1	1.15	5	4			2	218.70	7.05	57
Bayan Lepas Aerodrome, Penang ...	87.2	74.0	80.6	89	71	85	77	85.0	85.2	5.17	131.3	2.06	8	5	2		1	214.65	6.92	56
Bukit China, Malacca ...	84.3	74.3	79.3	87	70	79	76	82.8	83.8	3.77	95.8	0.58	15	14	4			174.90	5.64	46
Kluang, Johore ...	86.7	71.3	79.0	90	69	81	75	81.3	82.1	2.86	72.7	1.15	12	7	1	5		162.50	5.24	43
Bukit Lalang, Mersing, Johore	86.8	72.3	79.5	89	70	84	74	81.6	81.9	6.59	167.4	2.11	16	14	10	4		183.70	5.93	49
Alor Star, Kedah ...	87.7	74.7	81.2	90	71	84	77	86.2	86.3	6.73	170.9	1.35	17	12	7		3	176.30	5.69	46
Kota Bahru, Kelantan ...	89.3	74.1	81.7	92	70	81	77	85.1	85.3	4.76	120.9	1.36	15	15	3	1		198.20	6.39	51
Kuala Trengganu, Trengganu	88.7	73.6	81.1	92	71	83	76	83.6	85.0	4.81	122.2	1.19	13	12	4	1	1	190.70	6.15	49
HILL STATION.																				
Fraser's Hill, Pahang 4268 ft.	73.5	62.5	68.0	78	61	65	63	70.8	71.8	2.27	57.7	0.53	15	11		15		146.50	4.73	38
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	72.3	55.9	64.1	77	48	68	62	70.1	70.0	3.52	89.4	2.07	10	7				136.00	4.39	35
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	71.3	59.3	65.3	77	57	65	61			3.84	97.5	2.10	11	7				141.85	4.57	37

Compiled from Returns supplied by the Meteorological Branch, Malaya